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Landbird Inventory for Olympic National Park (2002-2003)
Final Report

Natural Resource Technical Report NPS/NCCN/NRTR—2009/159

ON THE COVER
Brown creeper
Photograph courtesy of NPS files

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Summary

In 2002 The Institute for Bird Populations (IBP) collaborated with personnel at Olympic National Park to initiate a two-year, park-wide, inventory of landbirds. The broad goals of the inventory are to elucidate spatial patterns of abundance across the park for a large suite of species, and to produce information that will assist park managers and cooperators in designing the park's long-term landbird monitoring program.

During our two field seasons, we counted 10,017 individual birds during 1,510 point counts conducted along 209 transects. Starting points for all these transects lay within a 1.5 km accessibility buffer around roads and trails, but otherwise the transects were fairly well distributed across the park. We documented 120 bird species in the park during the field season. Eighty eight of these were detected during at least one point count, while the remaining 32 were recorded only during our early season training session, or at other times during the season when observers were not conducting point counts. We also conducted detailed habitat assessments at each of the 1,510 survey points.

We present 'naïve' habitat-specific density estimates, unadjusted for differences in detectability, for all 88 species recorded during point counts. We also present habitat-specific density estimates, adjusted for species- and habitat-specific differences in detectability, for 41 species that were detected at least ten times during point counts, as well as lists of all species detected in each of 20 major park habitats. We rank habitats with regard to a) the number of species detected in each and b) the overall density of birds (all species pooled) estimated to occur in each, and find some substantial and perhaps surprising differences across park habitats. In particular, Sitka Spruce hosted the highest density of birds (9.44 birds/ha) of any well-sampled habitat, perhaps not surprising given the high canopies and complex vertical structure of Sitka Spruce stands. More surprising was that another low-elevation forest type, Western Redcedar, had the lowest density of birds (3.84 birds/ha) of any vegetated habitat type. The other low-elevation conifer forest types, Western Redcedar/Western Hemlock, Western Hemlock, and Douglas-fir, exhibited intermediate values. Other interesting findings were that birds were generally more abundant in west-side forest types than in east-side forests, and that even within west-side forest types, birds were generally less abundant than in similar habitats at North Cascades National Park Service Complex.

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Introduction

Ranging from sea level to over 2,000 m, Olympic National Park encompasses a broad gradient of habitats that are vital to local populations of numerous resident and migratory bird species. Many of these species have likely been negatively affected by extensive deforestation throughout much of the Olympic Peninsula, making the park's well-preserved habitats particularly important.

Reported declines of many birds breeding in North America have stimulated interest in avian population trends and mechanisms driving those trends (DeSante and George 1994). The North American Breeding Bird Survey suggests that landbird populations in Pacific Northwest late-seral forests appear to be in serious decline (Sauer et al. 2001). Although simple presence/absence data for birds in the park already exist (Smith et al. 1997), extant data are insufficient for adequately describing species/habitat relationships, producing quantitative estimates of habitat-specific bird density, or reliably extrapolating those estimates across the park's 3,800 km^2. Prior to the late 1990s, existing quantitative information on landbird density within the park was restricted to a very spatially limited study by Huff et al. (1985) on the park's western slopes, and two USFWS breeding bird survey routes. More recently, Jenkins et al. (2000) initiated a pilot study to field-test geographically extensive survey techniques in the park, and to quantify sources of variance in the analysis of point count data.

In September 2000, personnel from throughout the North Coast / Cascades Network met with landbird monitoring experts to produce recommendations for a long-term monitoring plan for landbirds (Siegel and Kuntz II, 2009). The panel recommended that each of the major parks in the network begin by initiating an inventory to elucidate spatial patterns of abundance for a large suite of species. Because birds are well-suited to serve as indicators of ecological change (Furness et al. 1993), these inventories could then serve as baselines for monitoring future ecological changes within the park, assessing the affects of future management actions on bird populations, and formulating efficient long-term bird monitoring strategies.

We designed this inventory project to determine habitat-specific density of landbirds during the breeding season at Olympic National Park, using methods consistent with those employed in other parks across the North Coast / Cascades Network (Siegel et al 2009b; Siegel et al. 2009a).

Methods

Sampling Strategy

Based on the recommendations of our September 2000 workshop (Siegel and Kuntz II 2009), as well as a follow-up meeting in 2002 that included many of the workshop participants as well as additional Olympic National Park personnel, we sought to design an inventory strategy that would provide a balance between sampling habitats in proportion to their spatial extent in the park, and ensuring that even relatively rare habitats would be sampled well enough for us to characterize their bird communities. Because we knew that many sampling occasions would be missed due to rain and other logistic constraints, we also sought to generate substantially more point count transects than we could actually use.

After extensive discussions about sampling design between the authors of this report and Olympic National Park and USGS personnel, we selected our transect start points according to the procedures described below. All GIS work was conducted by Roger Hoffmann at Olympic National Park.

Systematic Points

We generated a systematic, park-wide grid of points 2530 m apart (this number was arrived at through an iterative process to yield a desired number of points). For logistic and safety reasons, we then discarded points that were further than 1.5 km from a trail or road, or that fell on slopes>35º. This yielded 245 potential transect start points, which were then evaluated for accessibility by inspection of digital orthophotos and shaded relief maps. Points that were inaccessible due to steep slopes or dangerous stream crossings were discarded, leaving 158 potential systematic start points. The dominant vegetation type for each point was determined from Pacific Meridian Resources (1996) GIS coverages.

Trail Points

We expected that our crews would be able to complete approximately twice as many points per transect when working on trails versus working off-trail. We therefore decided to devote about a quarter of our sampling days to conducting transects along trails. Fifty trail transect start points were selected by a process that systematically selected segments of the park's routed trail coverage. Points on steep slopes were retained, because all points on trails were assumed to be safe to access.

Supplemental Points

Seventeen individual vegetation types were found to be poorly represented in the systematic and trail-based point coverage, with representation by fewer than 20 points. Pixels representing each of these types within 1.5 km of trails or roads and falling on slopes<35º were identified. Areas containing at least five pixels of the desired vegetation type out of a nine-pixel square were then identified. This yielded a database of points where the predominant vegetation type was one of the underrepresented types, in theoretically accessible areas. Forty points from each of these vegetation types were randomly selected. After reviewing for accessibility as described for systematic points, we retained 133 supplemental start points in the poorly represented habitats.

Field Methods

Conducting Point Counts

We conducted all fieldwork between May 22 and July 31 of 2002 and 2003. Crew members worked in pairs, and generally hiked into the backcountry for seven days at a time, during which they conducted transects on as many mornings as weather permitted. Prior to leaving for the field, crews were provided with coordinates and maps of at least six transect start points, selected such that each was generally no more than a one-day hike from another. In 2003 start points were assigned a randomly generated 'firing order' such that, logistic considerations aside, the decision of which points to complete when not all points could be completed was made randomly.

We used five-minute variable circular plot (VCP) point counts (Fancy and Sauer 2000, Siegel 2009) coupled with detailed habitat descriptions of each point count location as our primary means of surveying birds. VCP point counts entailed recording the horizontal distance, estimated to the nearest meter, to every bird seen or heard during the point count.

Each morning in the field, each two-person team conducted a transect of approximately 5-6 off-trail points or 10-12 on-trail points spaced 200 m apart. Transects began at pre-selected starting points which were located in the field with topographic maps and a hand-held GPS unit. Prior to starting the transect, one team member was designated the point-count observer and the other was designated the vegetation observer. The point-count observer flagged the trail from point to point as the transect was conducted; the vegetation observer then followed the trail of flagging, collecting vegetation data at the indicated point-count locations. Vegetation observers were careful to remain at least 200 m behind the point-count observer, to avoid influencing bird activity during the count. As a safety consideration, point count and vegetation observers remained in radio contact for the duration of the transect.

For on-trail transects, the observers completed their transect by collecting data at the starting point, and then proceeding along the trail in a pre-determined direction. For off-trail transects, observers chose the semi-cardinal direction (0°, 45°, 90°, etc.) that most closely approximated a perpendicular *toward* the nearest trail (on odd calendar days), or the semi-cardinal direction that most closely approximated a perpendicular *away* from the nearest trail (on even calendar days). Observers frequently encountered a river, cliff, or other barrier that prevented them from completing a transect along the intended compass bearing. In these cases they returned to the last successfully completed point, and then reoriented to the nearest semi-cardinal bearing that was not blocked by a barrier.

Point counts began within ten minutes of local sunrise, and continued until 3.5 hours after local sunrise. 'Flyovers'— defined as birds that flew over the top of the vegetation canopy, never touched down in the observer's field of view, and did not appear to be foraging, displaying, or behaving in any other way that might suggest a link to the habitat below— were tallied separately from other bird detections. Birds thought to have been recorded previously at another point were marked accordingly on the data forms. Geographical coordinates based on GPS readings and topographic maps were recorded at each sampling point, generally by the vegetation observer. We recorded whether each bird was initially detected during the first three

minutes or last two minutes of the point count, in order to improve comparability with data from the Breeding Bird Survey (BBS) which utilizes three-minute counts. In 2003 we also recorded whether each bird was initially detected visually or aurally, and whether the bird sang at any time during the count. These data may facilitate future analysis of a) error associated with estimating distances to unseen birds, and b) estimation of the density of singing males, rather than all birds pooled.

Additionally, whenever crew members detected species thought to be rare or difficult to sample in the park, they completed "Rare Bird Report Forms", including descriptions of the birds' appearance and behavior and geographical coordinates. These reports covered not only birds detected during point counts, but also birds detected while sampling vegetation, hiking between transects, relaxing at camp in the evening, or at any other time during the field season, including during our pre-season training session. Although our project focused explicitly on diurnal landbirds, we frequently used these rare bird report forms to record seabirds and nocturnal landbirds, which were rarely recorded during point counts.

Sampling Vegetation at Bird Survey Points

Vegetation descriptions at each point entailed assigning a primary habitat classification to a circular 50-m radius plot centered on the point count station, and also collecting more detailed data on vegetation structure and composition within two 20-m x 40-m subplots within that 50-m radius circle. Vegetation plots occasionally straddled more than one distinct habitat type; in these cases observers classified the point as being dominated by the habitat that covered the larger portion of the plot, and then additionally recorded the 'secondary' habitat present in the plot. Habitat classifications were based on the habitat categories described in the park's current GIS habitat coverage (Pacific Meridian Resources, 1996). Subsequent to data collection, however, we made some minor changes to the habitat classification system, as follows:

1) We combined points that were classified in the field as 'Meadow' and were in the mid-elevation zone or higher with points classified as 'Heather' to form a new category which we called 'Meadow/Heather'. 'Meadow' points in the park's low-elevation zone were grouped separately, in a category we called 'Low-Elevation Meadow'.

2) We split points that were classified in the field as 'Shrub' into two distinct habitat categories, 'Low-Elevation Shrub' (<820 m and/or comprising a generally low-elevation plant community) and 'High-Elevation Shrub' (>820 m and/or comprising a generally high-elevation plant community).

3) Points in forested areas where the canopy >20% conifer species and >20% deciduous species were classified as 'Conifer Deciduous Mix', a category which Pacific Meridian Resources (1996) used for mapping North Cascades National Park but did not use at Olympic National Park.

4) We reassigned points that were classified in the field as 'Western Hemlock' into either, 'West-side Western Hemlock' or 'East-side Western Hemlock' depending on whether they were located in west side or east side watersheds. We felt this split was necessary because Western Hemlock forest structure differs markedly on the east and

west sides of the park, and because bird communities within those forests also differ considerably.

We also collected more detailed information describing habitat structure and composition within each of two 20 m x 40 m subplots adjacent to the point count station. The first subplot straddled the line of travel walked by the vegetation observer as (s)he approached the point count station, beginning 50m from the station and ending 10 m from the station. The second subplot straddled the line of travel walked as the observer left the point count station, beginning 10 m from the station and ending 50 m from the station.

Although it was not a specific objective of this inventory to determine correlates of vegetation structure and composition (beyond simple plant community classification) with avian distribution patterns, we described vegetation characteristics at each sampling point to permit future analyses. Within each plot we assessed the composition and structure of both the canopy and the understory. For the canopy, we estimated the average canopy height and subcanopy height, if a subcanopy was present. We tallied all trees by size class and species, and also counted snags and downed logs. For the understory we estimated the percent cover contributed by each constituent species of woody plant, and also estimated the percent cover of each component of groundcover, including living as well as non-living elements. More detail about the habitat parameters we measured are provided in Appendix A.

Training and Testing

At the beginning of each field season, we provided our field crew with an intensive two-week training program. We trained our crew members, who generally had prior experience birding and conducting biological fieldwork, in visual and aural bird identification, distance estimation, plant identification, orienteering, backcountry safety, and project protocols. Crew members honed their bird identification skills by spending days in the field birding and practicing point counts with experienced trainers, and then reviewing at night with the aid of field guides, taped songs and calls, and an instructional CD-ROM. At the end of the two-week training period, we gave all crew members a rigorous exam involving the identification of approximately 100 taped songs and calls (some of them grouped together in rapid succession to produce 'simulated point counts') as well as 30-40 photographic images (generally of rarer species or less obvious female plumages). Crew members were not permitted to conduct point counts (they worked solely as vegetation observers instead) until they passed the exam, which was altered for each administration. Passing the exam, which required a near-perfect score, ensured that observers could competently identify by sight and sound all species expected to occur in the park.

Data Analysis

All data were entered into DBASE databases, which we then checked for errors using an array of automated and manual data verification routines. Copies of these databases are being submitted along with this report.

Within each habitat, each species' apparent density, uncorrected for detectability, was calculated as

$$\frac{(d_{50}/p_{hab})}{0.7854},$$

where d_{50} is the total number of 50 m radius detections tallied at all points in that habitat, p_{hab} is the total number of points sampled within that habitat type, and 0.7854 is the portion of a hectare covered by a 50 m radius circle

The effective detection radius for birds during point counts has been shown to vary across habitats and between species (Burnham 1981; Barker and Sauer 1995). Because vegetative structure differs dramatically across park habitats, it is necessary to correct for inter-habitat variability in detectability before densities can be compared across habitats (Buckland et al. 2001). Additionally, some species vocalize much more loudly than others, so detectability corrections must be performed on a species by species basis. We used the computer program DISTANCE 4.0 Release 2 (Thomas et al. 2002) to correct for inter-habitat differences in detectability and to produce estimates of absolute density for all species detected at least ten times during point counts.

Distance-sampling experts generally advise that at least 60-80 detections are necessary for reliably modeling the relationship between detection probability and distance from the observer (Buckland et al. 2001). We amassed 60 or more detections in a single habitat type for just a small suite of species, so for the purpose of modeling detection probability, we pooled habitats into two general groups, based on vegetation structure and, presumably, likelihood of detecting birds at moderate or large distances:

- sparsely vegetated habitats: Low Elevation Meadow, Heather/Meadow, Mountain Hemlock, Subalpine Fir, Rock, Snow

- densely vegetated habitats: Red Alder, Bigleaf Maple, Hardwood Mix Forest, Low-elevation Shrub, Conifer Deciduous Mix, Sitka Spruce, Western Redcedar, Western Redcedar/Western Hemlock, West-side Western Hemlock, East-side Western Hemlock, Douglas-fir, High-elevation Shrub, Pacific Silver Fir

Within each habitat group, we used DISTANCE to fit detection functions for each species detected at least 60 times in the pooled habitats that constituted that group. We set the data filter to truncate the largest 10% of observations (Buckland et al. 2001), and then fit models using the half-normal key function and both the cosine and polynomial series expansions. We used the Akaike Information Criterion (AIC) to select among models with different forms and numbers of expansion terms (Akaike 1973; Burnham and Anderson 1998). We then applied the habitat group detection function separately to the data in each of the constituent habitats, to produce habitat-specific estimates of absolute abundance, taking into account species- and habitat-specific variation in detectability.

For species that were detected at least ten times in the park, but fewer than 60 times in one or both habitat groups, we used detectability functions generated from observations of the same species at North Cascades National Park (Siegel et al. 2009a) to adjust our density estimates at Olympic National Park. We did this by fitting the uniform key function with no adjustment

terms, and using 'borrowed' estimates of detection probability and detection probability variance from the North Cascades analyses as multipliers (Thomas et al. 2002). However, many species that were relatively rare at Olympic National Park were also relatively rare at North Cascades National Park, and consequently we were unable to model detectability functions for them at either park. For such species that were detected at least ten times at Olympic National Park, we matched them with 'surrogate species'—species with similar song volume, song pitch, and/or singing location (e.g. high in the canopy) that were detected at least 60 times within a habitat group. We then used the detection probability and detection probability variance of the 'surrogate' species in the same way described above.

For all of the analyses described above, our results for Townsend's Warbler include some birds on the east side of the park that may have actually been Hermit Warblers or Hermit Warbler – Townsend's Warbler hybrids, as the eastern part of the park falls within the known hybrid zone for these two species (Rohwer and Wood 1998). The songs of Townsend's and Hermit Warblers and their hybrids are difficult to distinguish from one another, making positive identification almost impossible with visual confirmation. Our crew members occasionally suspected they were hearing Hermit Warblers or hybrids during east side transects, but were unable to see the singing birds. Lacking visual confirmation, we have interpreted the data cautiously, classifying all birds as Townsend's Warblers.

To compare the overall density of birds (all species pooled) across habitats, we summed the adjusted density estimates for all species within each habitat. This method likely underestimates the true density slightly, since we produced adjusted density estimates for just 41 of the 88 species detected during point counts. The bias should be minimal however, as all but a few of the species for which we did not produce adjusted density estimates were quite rare in the park, and consequently have little effect on overall bird density.

Results and Discussion

Scope of Work Accomplished

We recorded 10,017 individual birds during 1,510 point counts conducted along 209 transects (Fig. 1). During our 168 off-trail transects, we completed an average of 6.0 points per transect, slightly higher than the average of 5.3 point per transect we obtained in North Cascades National Park (Siegel et al. 2009a). As we expected, we were able to complete substantially more points per transect when we conducted on-trail transects. During our 41 on-trail transects, we averaged 12.3 points per transect.

Our intention was to distribute our effort such that we would spend approximately 75% of our survey days completing off-trail transects, and 25% of our survey days completing on-trail transects. Our efforts ended up slightly skewed toward off-trail transects; we completed 168 of these (80% of the total) compared to 41 (20% of the total) on-trail transects. This small bias toward off-trail transects resulted from a combination of stochastic factors (we seemed to be rained out more often on days when we intended to conduct on-trail transects) as well as the fact that candidate starting points were deliberately distributed more heavily along high-elevation stretches of trails, many of which were particularly difficult to access in 2002 due to lingering snowpacks.

The largest share of all our sampling points were classified as West-side Western Hemlock (221 points), but ten other habitats were represented by at least 60 sampling points (Table 1). Only four habitats, Lodgepole Pine, Low-elevation Meadow, Recent Fire Area, and Alaska Yellowcedar, were represented by fewer than 15 points (Table 1). Spatial distribution of each of these habitats is very restricted in the park and, with the exception of Low-elevation Meadow, were consequently never deliberately targeted for sampling.

For most habitats, point-count locations were well distributed geographically across the extent of the habitat in the park. Figures 2-18 indicate the spatial extent of each habitat type within the park (as mapped in the Pacific Meridian Resources (1996) GIS database) and the locations of each transect comprising at least one point classified as being dominated by that habitat type. Note that the extent of Conifer Deciduous Mix in the park is not indicated, as it was not mapped by Pacific Meridian Resources.

Bird Species Detected in the Park

We documented 120 species in the park during the field season (Table 2). Thirty five of the species we detected (many of them shorebirds) were never actually recorded during point counts, but instead were detected at other times by our crew members while they were hiking or camping, or during our training session at the beginning of the season.

Density Estimates

Eighty-five of the 120 species we recorded in the park were detected during at least one point count. We estimated habitat-specific density, accounting for species- and habitat-specific

variability in detectability, for 41 of them (Table 3). Although we detected several additional species at least ten times during point counts, we elected not to estimate their density because some aspect of their behavior or distribution makes density estimation using our methods questionable. These included Vaux's Swift, American Crow, and Common Raven because they typically range over large distances within a short time period, Rufous Hummingbird because the species was clearly attracted to our flagging, and Belted Kingfisher, because the species is tightly coupled to linear riparian corridors, rather than being broadly distributed across the landscape.

Tables 4 - 23 provide lists of each species detected during point counts in each habitat, except for Recent Fire Area and Alaska Yellowcedar, which were sampled with only one point count each. The tables also provide

1) the number of detections (excluding flyovers) of each species within each habitat,

2) the number of points at which the species was detected in each habitat,

3) the 'unadjusted density' of each species (based only on the number of detections within 50 m of the observer, and incorporating no correction for species- or habitat-specific variation in detectability),

4) the adjusted density estimate, which takes into account habitat- and species-specific variation in detectability, for each species recorded at least ten times park-wide during point counts, and

5) the coefficient of variation, degrees of freedom, and 95% confidence interval associated with each adjusted density estimate.

To provide an easy way to compare species-specific densities across habitats, Tables 24 - 64 present nearly the same data as described above for all 41 species for which we produced adjusted density estimates, organized by species rather than habitat.

The overall density of birds (all species pooled) varied greatly across park habitats (Table 65). Sitka Spruce hosted the highest density of birds (9.44 birds per ha), perhaps not surprising given the high canopies and complex vertical structure of Sitka Spruce stands. More surprising was that Western Redcedar-- another low-elevation, west-side forest type-- had the lowest density of birds (3.84 birds per ha) of any vegetated habitat type. The other low-elevation, primarily west-side conifer forest types, Western Redcedar/Western Hemlock, West-side Western Hemlock, and Douglas-fir, exhibited intermediate values. Conifer Deciduous Mix (8.53 birds per ha) and Red Alder (8.30 birds per ha) also exhibited high densities of birds, at least compared to the majority of habitats, which hosted between 6.00 and 6.95 birds per ha. At the lower end of the scale, Rock, Western Redcedar/Western Hemlock, East-side Western Hemlock, High-elevation Shrub, Western Redcedar, and Snow all exhibited relatively low densities of birds. While all the high-ranking habitats were predictably low elevation habitats, the low-ranking habitats were surprisingly drawn from both high and low elevations.

Birds were generally more abundant in west-side forest types than in east-side forests. West-side Western Hemlock exhibited the fourth highest overall avian density, whereas East-side Western Hemlock had one of the lower avian density estimates for any habitat (5.00 birds per ha). Particular species with substantially lower (though not necessarily significant at $P < 0.05$) densities in East-side than in West-side Western Hemlock included Pacific-slope Flycatcher, Steller's Jay (not detected at all in East-side Western Hemlock), Brown Creeper, Winter Wren, and American Robin.

At higher elevations, inter-habitat differences in avian density were generally less pronounced than at lower elevations. Overall bird density in Mountain Hemlock (6.00 birds per ha) and Meadow/Heather (6.05 birds per ha) was nearly identical, and the corresponding value for Subalpine Fir (6.58 birds per ha) was only slightly greater. Few if any species exhibited striking differences in density among these three habitats, although it is noteworthy that Horned Lark, American Pipit, and Chipping Sparrow were detected exclusively or nearly exclusively in Meadow/Heather.

The number of species detected in each habitat also varied greatly (Table 66), though we caution that these results are not straight-forward to interpret, as they are heavily confounded by variable survey effort across habitats, an issue which has much less bearing on the relative density estimates described above. While there is no reason to expect density estimates to increase with the number of points sampled, we would indeed expect to see such a relationship between the number of species detected and the number of points sampled. Table 66 is, thus, best interpreted by looking at the obvious exceptions to this general pattern. Low-elevation Shrub (50 species) and High-elevation Shrub (41 species), respectively, are the habitats with the second and fifth highest numbers of species detected, despite being very sparely sampled. Indeed, High-elevation Shrub, with just 15 points, is the most sparsely sampled habitat included in the table. Conversely, Meadow/Heather and Subalpine Fir both rank fairly low, despite being the second and fourth most intensively sampled habitats.

Overall density of birds was substantially lower at Olympic National Park than at North Cascades National Park (Siegel et al. 2009a). Across the entire park, we detected an average of 7.6 birds per point at North Cascades, compared to only 6.6 birds per point at Olympic, a difference of nearly 15%. In a few of the habitat types shared by both parks, density estimates of all species pooled were comparable (e.g. 7.22 birds per ha in Western Hemlock forests at North Cascades compared to 6.95 birds per ha in Western Hemlock forests at Olympic), but in most habitats overall density estimates were much higher at North Cascades. Western Redcedar forests provide an extreme example of this phenomenon; we estimated overall bird density to be 7.83 birds per ha in Western Redcedar forests at North Cascades, compared with only 3.97 birds per ha in Western Redcedar forests at Olympic. Elucidating the factors that limit avian density at Olympic, at least relative to North Cascades, might be a fertile area for future investigations. Estimates of avian density are not yet available from the ongoing avian inventory at Mt. Rainier National Park, but when those data become available next year, it will be interesting to compare results from all three parks.

Opportunities for Additional Data Analysis

Although beyond the scope of this report, the data we present offer at least two additional opportunities for additional analysis:

1) the vegetation data we collected at each sampling point provide a wealth of opportunity for further analyses of species-habitat relationships at Olympic, and across the North Coast Cascades Network.

2) the inventory point count results should prove useful for the design of a long-term point count monitoring project in the park, and especially for the assessment of the statistical power of any such project to detect temporal trends in bird populations.

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Table 1. Number of off-trail, on-trail, and total point counts completed in each major habitat at Olympic National Park.

Habitat	Off-trail	On-trail	Total
West-side Western Hemlock	173	48	221
Meadow/Heather	107	96	203
Douglas-fir	117	38	155
Subalpine Fir	63	71	134
Conifer Deciduous Mix	80	26	106
Western Redcedar/Western Hemlock	67	34	101
East-side Western Hemlock	12	73	85
Pacific Silver Fir	46	38	84
Rock	48	36	84
Mountain Hemlock	36	35	71
Sitka Spruce	44	16	60
Snow	41	8	49
Red Alder	31	8	39
Low-elevation Shrub	23	6	29
Western Redcedar	10	10	20
Bigleaf Maple	15	4	19
Hardwood Mix Forest	11	8	19
High-elevation Shrub	10	5	15
Lodgepole Pine[1]	5	4	9
Low Elevation Meadow	4	1	5
Recent Fire Area[1]	1	0	1
Alaska Yellowcedar[1]	0	1	1
Total			1510

[1]Very spatially restricted habitat; not deliberately targeted by our sampling strategy.

Table 2. All bird species detected by IBP staff in Olympic National Park during the 2002 and 2003 field seasons. Asterisks indicate species that were documented by our crew members but were never detected during point counts.

1. Brown Pelican	41. Pigeon Guillemot*	81. Winter Wren
2. Double-crested Cormorant*	42. Marbled Murrelet	82. Marsh Wren*
3. Pelagic Cormorant*	43. Band-tailed Pigeon	83. American Dipper
4. Great Blue Heron	44. Mourning Dove	84. Golden-crowned Kinglet
5. Turkey Vulture*	45. Northern Pygmy-Owl*	85. Ruby-crowned Kinglet
6. Canada Goose	46. Spotted Owl*	86. Townsend's Solitaire
7. Wood Duck*	47. Barred Owl	87. Swainson's Thrush
8. Mallard	48. Common Nighthawk	88. Hermit Thrush
9. Greater Scaup*	49. Vaux's Swift	89. American Robin
10. Harlequin Duck	50. Rufous Hummingbird	90. Varied Thrush
11. White-winged Scoter*	51. Belted Kingfisher	91. European Starling*
12. Bufflehead*	52. Red-naped Sapsucker*	92. American Pipit
13. Barrow's Goldeneye*	53. Red-breasted Sapsucker	93. Cedar Waxwing
14. Hooded Merganser*	54. Downy Woodpecker	94. Orange-crowned Warbler
15. Common Merganser	55. Hairy Woodpecker	95. Yellow Warbler
16. Red-breasted Merganser*	56. Northern Flicker	96. Yellow-rumped Warbler
17. Osprey	57. Pileated Woodpecker	97. Black-throated Gray Warbler
18. Bald Eagle	58. Olive-sided Flycatcher	98. Townsend's Warbler
19. Sharp-shinned Hawk*	59. Western Wood-Pewee	99. MacGillivray's Warbler
20. Northern Goshawk	60. Willow Flycatcher*	100. Common Yellowthroat
21. Red-tailed Hawk	61. Hammond's Flycatcher	101. Wilson's Warbler
22. American Kestrel	62. Pacific-slope Flycatcher	102. Western Tanager
23. Ruffed Grouse	63. Cassin's Vireo	103. Spotted Towhee
24. Blue Grouse	64. Hutton's Vireo	104. Chipping Sparrow
25. California Quail	65. Warbling Vireo	105. Savannah Sparrow*
26. Virginia Rail	66. Gray Jay	106. Fox Sparrow*
27. Killdeer	67. Steller's Jay	107. Song Sparrow
28. Black Oystercatcher*	68. Clark's Nutcracker*	108. White-crowned Sparrow
29. Greater Yellowlegs*	69. American Crow	109. Golden-crowned Sparrow*
30. Spotted Sandpiper	70. Common Raven	110. Dark-eyed Junco
31. Whimbrel*	71. Horned Lark	111. Black-headed Grosbeak
32. Marbled Godwit*	72. Tree Swallow	112. Red-winged Blackbird
33. Western Sandpiper*	73. Violet-green Swallow	113. Brown-headed Cowbird
34. Least Sandpiper*	74. N. Rough-winged Swallow	114. Gray-crowned Rosy-Finch
35. Pectoral Sandpiper*	75. Cliff Swallow*	115. Pine Grosbeak
36. Bonaparte's Gull*	76. Barn Swallow	116. Purple Finch
37. Ring-billed Gull*	77. Black-capped Chickadee	117. Red Crossbill
38. Western Gull*	78. Chestnut-backed Chickadee	118. Pine Siskin
39. Glaucous-winged Gull	79. Red-breasted Nuthatch	119. American Goldfinch*
40. Caspian Tern*	80. Brown Creeper	120. Evening Grosbeak

Table 3. Species for which we estimated habitat-specific density in densely vegetated and/or sparsely vegetated habitats. 'Self' indicates species for which we amassed at least 60 detections within a habitat group (densely vegetated habitats or sparsely vegetated habitats) and were able to model detectability without using data from 'surrogate' species or data from North Cascades National Park. For species that were detected less frequently (but at least ten times) at Olympic National Park, we modeled detectability using data from the same species or a more frequently encountered species at North Cascades NP or using data from another more frequently encountered species at Olympic National Park, as indicated.

	Data Source for Detectability Modeling	
Species	Densely Vegetated Habitats	Sparsely Vegetated Habitats
Blue Grouse	self	Hermit Thrush[1]
Spotted Sandpiper	Dark-eyed Junco[1]	Dark-eyed Junco[1]
Band-tailed Pigeon	Blue Grouse[1]	Red-breasted Nuthatch[1]
Hairy Woodpecker	American Robin[1]	American Robin[1]
Northern Flicker	American Robin[1]	American Robin[1]
Pileated Woodpecker	Olive-sided Flycatcher[2]	American Robin[1]
Olive-sided Flycatcher	Olive-sided Flycatcher[2]	American Robin[1]
Hammond's Flycatcher	self	Dark-eyed Junco[1]
Pacific-slope Flycatcher	self	Dark-eyed Junco[1]
Warbling Vireo	self	American Robin[1]
Gray Jay	Steller's Jay[1]	Red-breasted Nuthatch[1]
Steller's Jay	self	American Robin[1]
Horned Lark	not detected	American Pipit[1]
Chestnut-backed Chickadee	self	self
Red-breasted Nuthatch	self	self
Brown Creeper	self	Chestnut-backed Chickadee[1]
Winter Wren	self	self
Golden-crowned Kinglet	self	self
Ruby-crowned Kinglet	Yellow-rumped Warbler[2]	Yellow-rumped Warbler[2]
Townsend's Solitaire	not detected	Hermit Thrush[1]
Swainson's Thrush	self	Hermit Thrush[1]
Hermit Thrush	self	self
American Robin	self	self
Varied Thrush	self	self
American Pipit	not detected	self
Orange-crowned Warbler	Dark-eyed Junco[1]	Dark-eyed Junco[1]
Yellow Warbler	Yellow Warbler[2]	Yellow-rumped Warbler[2]
Yellow-rumped Warbler	Yellow-rumped Warbler[2]	Yellow-rumped Warbler[2]
Black-throated G. Warbler	self	Townsend's Warbler[2]
Townsend's Warbler	self	Townsend's Warbler[2]
MacGillivray's Warbler	Wilson's Warbler[1]	not detected
Common Yellowthroat	Wilson's Warbler[1]	Winter Wren[1]
Wilson's Warbler	self	Yellow-rumped Warbler[2]
Western Tanager	self	not detected
Song Sparrow	self	Fox Sparrow[2]

Table 3. continued

Species	Data Source for Detectability Modeling	
	Densely Vegetated Habitats	Sparsely Vegetated Habitats
White-crowned Sparrow	Song Sparrow[1]	Fox Sparrow[2]
Dark-eyed Junco	self	self
Black-headed Grosbeak	American Robin[1]	not detected
Pine Grosbeak	Dark-eyed Junco[1]	Dark-eyed Junco[1]
Red Crossbill	self	self
Pine Siskin	self	self

[1]Indicates delectability was modeled using surrogate species data from Olympic National park.
[2]Indicates detectability was modeled using data from North Cascades National park.

Table 4. Results from 39 point counts at locations classified as Red Alder. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Mallard	0	1	0.00	--				
Common Merganser	1	1	0.00	--				
Virginia Rail	1	1	0.03	--				
Spotted Sandpiper	1	1	0.00	**<0.01**	100.3	38	<0.01	0.02
Glaucous-winged Gull	1	1	0.00	--				
Band-tailed Pigeon	3	3	0.03	**0.05**	72.5	38	0.01	0.17
Mourning Dove	2	2	0.00	--				
Hairy Woodpecker	2	2	0.03	**0.05**	70.8	38	0.01	0.18
Hammond's Flycatcher	18	12	0.46	**0.55**	49.0	192	0.22	1.37
Pacific-slope Flycatcher	49	31	1.37	**1.20**	25.2	545	0.74	1.96
Hutton's Vireo	1	1	0.00	--				
Warbling Vireo	30	22	0.42	**0.36**	20.0	52	0.24	0.53
Steller's Jay	2	2	0.07	**0.04**	71.3	41	0.01	0.13
American Crow	5	5	0.00	--				
Common Raven	1	3	0.00	--				
Black-capped Chickadee	2	2	0.00	--				
Chestnut-backed Chickadee	12	6	0.39	**0.63**	51.1	63	0.24	1.64
Brown Creeper	1	1	0.03	**0.04**	100.7	39	0.01	0.24
Winter Wren	41	23	0.69	**0.64**	20.7	73	0.43	0.96
Golden-crowned Kinglet	15	11	0.49	**1.18**	35.8	63	0.59	2.35
Swainson's Thrush	31	18	0.39	**0.88**	27.3	102	0.52	1.49
American Robin	42	27	0.72	**0.99**	18.2	105	0.69	1.42
Varied Thrush	5	5	0.03	**0.03**	43.8	44	0.01	0.06
Black-throated Gray Warbler	12	10	0.10	**0.18**	35.2	74	0.09	0.37
Townsend's Warbler	1	1	0.03	**0.02**	112.4	60	<0.01	0.10
Wilson's Warbler	19	13	0.46	**0.54**	32.5	48	0.28	1.01
Western Tanager	4	4	0.03	**0.05**	58.1	43	0.02	0.16
Song Sparrow	15	13	0.29	**0.34**	29.6	60	0.19	0.60
White-crowned Sparrow	2	1	0.00	**0.04**	101.0	38	0.01	0.23

Table 4, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Dark-eyed Junco	17	11	0.33	**0.41**	33.5	42	0.21	0.79
Red Crossbill	6	2	0.16	**0.08**	86.2	41	0.02	0.38
Evening Grosbeak	1	1	0.03	--				

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 5. Results from 19 point counts at locations classified as Bigleaf Maple. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Harlequin Duck	1	5	0.07	--				
Common Merganser	0	6	0.00	--				
Vaux's Swift	2	6	0.13	--				
Rufous Hummingbird	4	1	0.27	--				
Belted Kingfisher	1	14	0.00	--				
Red-breasted Sapsucker	1	3	0.07	**0.00**				
Hairy Woodpecker	2	1	0.13	**0.09**	69.7	18	0.03	0.37
Northern Flicker	1	2	0.00	**0.00**				
Pileated Woodpecker	1	1	0.00	**0.01**	106.0	18	<0.01	0.09
Hammond's Flycatcher	7	5	0.34	**0.38**	63.5	49	0.12	1.21
Pacific-slope Flycatcher	12	10	0.47	**0.45**	40.6	37	0.21	1.00
Warbling Vireo	12	10	0.07	**0.30**	28.5	21	0.17	0.53
Steller's Jay	1	1	0.07	**0.04**	101.1	19	0.01	0.22
American Crow	0	1	0.00	--				
Common Raven	1	1	0.00	--				
Tree Swallow	1	1	0.07	--				
Chestnut-backed Chickadee	10	7	0.54	**0.86**	44.9	36	0.36	2.04
Winter Wren	15	10	0.47	**0.51**	29.3	24	0.28	0.92
Golden-crowned Kinglet	2	2	0.13	**0.34**	70.8	20	0.09	1.30
Swainson's Thrush	5	3	0.07	**0.25**	60.9	21	0.08	0.80
American Robin	17	11	0.54	**0.84**	30.5	25	0.46	1.56
Varied Thrush	4	3	0.07	**0.05**	59.4	19	0.01	0.14
Orange-crowned Warbler	1	1	0.00	**0.04**	100.3	18	0.01	0.23
Black-throated Gray Warbler	4	4	0.13	**0.14**	49.8	25	0.05	0.36
Townsend's Warbler	1	1	0.00	**0.03**	112.4	29	0.01	0.21
MacGillivray's Warbler	2	2	0.07	**0.04**	100.6	18	0.01	0.28
Wilson's Warbler	5	5	0.20	**0.34**	40.9	21	0.15	0.78
Western Tanager	6	6	0.13	**0.19**	42.1	23	0.08	0.43
Song Sparrow	6	5	0.20	**0.20**	60.0	20	0.06	0.63

Table 5, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
White-crowned Sparrow	1	1	0.00	**0.04**	101.0	18	0.01	0.26
Dark-eyed Junco	14	8	0.54	**0.78**	31.8	20	0.41	1.50
Black-headed Grosbeak	3	3	0.13	**0.22**	55.7	18	0.07	0.66
Red Crossbill	1	1	0.00	**0.03**	101.4	19	<0.01	0.17
Pine Siskin	2	2	0.13	**0.19**	89.4	47	0.04	0.89

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 6. Results from 19 point counts at locations classified as Hardwood Mix Forest. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Canada Goose	1	1	0.07	--				
Red-tailed Hawk	1	1	0.00	--				
Blue Grouse	2	2	0.07	**0.02**	101.9	19	<0.01	0.10
Rufous Hummingbird	1	1	0.07	--				
Belted Kingfisher	2	2	0.07	--				
Downy Woodpecker	1	1	0.07	--				
Hairy Woodpecker	3	3	0.13	**0.15**	55.7	18	0.05	0.44
Pileated Woodpecker	2	2	0.00	**0.03**	77.2	18	0.01	0.12
Olive-sided Flycatcher	1	1	0.00	**0.03**	106.0	18	0.01	0.20
Hammond's Flycatcher	7	5	0.40	**0.38**	63.5	49	0.12	1.21
Pacific-slope Flycatcher	16	11	0.60	**0.76**	32.1	68	0.40	1.41
Warbling Vireo	17	13	0.34	**0.43**	20.3	24	0.29	0.66
Steller's Jay	1	1	0.00	**0.04**	101.1	19	0.01	0.22
Common Raven	3	3	0.00	--				
Tree Swallow	2	1	0.00	--				
Violet-green Swallow	1	1	0.00	--				
Barn Swallow	2	1	0.00	--				
Chestnut-backed Chickadee	3	3	0.13	**0.21**	72.9	23	0.06	0.83
Brown Creeper	1	1	0.07	**0.09**	100.7	19	0.02	0.52
Winter Wren	20	13	0.67	**0.66**	25.9	27	0.39	1.11
Golden-crowned Kinglet	3	3	0.20	**0.52**	57.0	22	0.17	1.56
Swainson's Thrush	5	4	0.07	**0.31**	52.1	23	0.11	0.85
American Robin	22	14	0.67	**1.09**	22.3	34	0.70	1.71
Varied Thrush	4	4	0.00	**0.05**	47.1	20	0.02	0.12
Orange-crowned Warbler	2	1	0.00	**0.08**	100.3	18	0.01	0.46
Black-throated Gray Warbler	4	4	0.13	**0.10**	58.0	23	0.03	0.32
Townsend's Warbler	3	2	0.00	**0.10**	89.1	39	0.02	0.46
Common Yellowthroat	1	1	0.00	**0.00**				
Wilson's Warbler	3	2	0.13	**0.14**	100.6	18	0.02	0.79

Table 6, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Western Tanager	3	2	0.20	**0.11**	74.4	20	0.03	0.45
Song Sparrow	1	1	0.07	**0.05**	101.0	19	0.01	0.29
White-crowned Sparrow	3	2	0.00	**0.13**	74.2	18	0.03	0.53
Dark-eyed Junco	11	9	0.40	**0.62**	28.5	21	0.34	1.10
Black-headed Grosbeak	1	1	0.00	**0.07**	100.7	18	0.01	0.43
Brown-headed Cowbird	1	1	0.07	--				

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 7. Results from 29 point counts at locations classified as Low-elevation Shrub. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Bald Eagle	1	1	0.00	--				
Blue Grouse	4	4	0.04	**0.05**	51.1	38	0.02	0.12
Killdeer	1	1	0.00	--				
Spotted Sandpiper	2	2	0.00	**0.01**	69.9	28	<0.01	0.04
Unidentified Gull	2	1	0.09	--				
Band-tailed Pigeon	4	4	0.09	**0.12**	51.1	28	0.05	0.33
Mourning Dove	1	1	0.00	--				
Unidentified Owl	1	1	0.00	--				
Vaux's Swift	3	2	0.13	--				
Rufous Hummingbird	14	12	0.61	--				
Belted Kingfisher	2	2	0.04	--				
Red-breasted Sapsucker	1	1	0.04	--				
Hairy Woodpecker	1	1	0.04	**0.03**	100.7	28	0.01	0.18
Pileated Woodpecker	1	1	0.00	**0.01**	106.0	28	<0.01	0.06
Olive-sided Flycatcher	1	1	0.00	**0.02**	106.0	28	<0.01	0.12
Hammond's Flycatcher	3	3	0.09	**0.12**	68.9	63	0.04	0.43
Pacific-slope Flycatcher	19	16	0.40	**0.53**	32.3	104	0.28	0.99
Hutton's Vireo	1	1	0.00	--				
Warbling Vireo	11	9	0.18	**0.20**	31.4	32	0.10	0.36
Steller's Jay	4	4	0.04	**0.07**	57.5	32	0.02	0.22
American Crow	3	4	0.09	--				
Common Raven	1	2	0.00	--				
Tree Swallow	1	1	0.04	--				
Black-capped Chickadee	1	1	0.04	--				
Chestnut-backed Chickadee	10	7	0.40	**0.70**	45.8	54	0.29	1.68
Red-breasted Nuthatch	1	1	0.00	**0.01**	101.6	30	<0.01	0.07
Winter Wren	14	13	0.13	**0.29**	27.7	39	0.17	0.50
Golden-crowned Kinglet	3	2	0.13	**0.34**	75.4	31	0.09	1.33
Swainson's Thrush	35	20	0.66	**1.22**	25.4	93	0.74	2.00

Table 7, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Hermit Thrush	1	1	0.00	**0.01**	108.3	38	<0.01	0.07
American Robin	29	16	0.70	**0.94**	26.0	44	0.56	1.58
Varied Thrush	6	6	0.00	**0.04**	43.0	32	0.02	0.09
Cedar Waxwing	5	3	0.18	--				
Orange-crowned Warbler	4	3	0.04	**0.05**	69.9	28	0.01	0.19
Yellow Warbler	5	5	0.22	**0.43**	42.6	28	0.19	1.00
Black-throated Gray Warbler	5	4	0.09	**0.11**	54.3	37	0.04	0.32
Townsend's Warbler	1	1	0.00	**0.02**	112.4	44	<0.01	0.13
MacGillivray's Warbler	1	1	0.00	**0.03**	100.6	28	0.01	0.17
Common Yellowthroat	8	6	0.35	**0.56**	41.3	28	0.25	1.27
Wilson's Warbler	9	7	0.35	**0.41**	37.7	33	0.19	0.85
Western Tanager	3	3	0.13	**0.07**	57.6	32	0.02	0.22
Spotted Towhee	2	2	0.04	--				
Song Sparrow	8	6	0.31	**0.26**	42.2	35	0.11	0.59
White-crowned Sparrow	3	2	0.13	**0.09**	74.8	28	0.02	0.34
Dark-eyed Junco	3	3	0.04	**0.07**	69.9	29	0.02	0.27
Red-winged Blackbird	1	1	0.04	--				
Brown-headed Cowbird	1	1	0.00	--				
Purple Finch	1	1	0.00	--				
Red Crossbill	1	1	0.00	**0.02**	101.4	30	<0.01	0.11
Pine Siskin	1	2	0.00	**0.00**				

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 8. Results from five point counts at locations classified as Low Elevation Meadow. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Bald Eagle	1	1	0.00	**--**				
Spotted Sandpiper	5	1	1.02	**7.35**	100.4	4	0.72	74.63
Band-tailed Pigeon	1	1	0.00	**0.01**	101.1	4	0.00	0.13
Rufous Hummingbird	1	1	0.26	**--**				
Belted Kingfisher	1	1	0.00	**--**				
Pileated Woodpecker	1	1	0.00	**0.13**	101.2	4	0.01	0.30
Pacific-slope Flycatcher	4	3	0.51	**1.45**	47.6	4	0.41	5.09
Warbling Vireo	2	2	0.00	**0.39**	101.2	4	0.04	4.02
American Crow	2	1	0.00	**--**				
N. Rough-winged Swallow	1	1	0.26	**--**				
Barn Swallow	1	1	0.26	**--**				
Chestnut-backed Chickadee	3	2	0.76	**1.94**	81.4	9	0.38	9.78
Winter Wren	2	2	0.00	**0.28**	61.9	4	0.06	1.33
Golden-crowned Kinglet	2	2	0.26	**0.58**	100.4	4	0.06	5.79
Swainson's Thrush	8	5	0.76	**0.69**	41.1	4	0.23	2.06
American Robin	6	3	0.51	**1.18**	43.8	5	0.41	3.41
Varied Thrush	2	2	0.00	**0.07**	66.3	5	0.02	0.34
Black-throated Gray Warbler	1	1	0.00	**0.20**	101.1	4	0.02	2.09
Townsend's Warbler	4	3	0.26	**1.31**	49.0	4	0.36	4.74
Common Yellowthroat	1	1	0.00	**0.38**	100.4	4	0.04	3.88
Wilson's Warbler	1	1	0.00	**0.00**				
Song Sparrow	3	3	0.00	**1.10**	66.4	4	0.21	5.88
Dark-eyed Junco	4	3	0.51	**0.80**	41.8	4	0.27	2.34

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 9. Results from 106 point counts at locations classified as Conifer Deciduous Mix. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Great Blue Heron	2	2	0.00	--				
Mallard	1	1	0.00	--				
Osprey	1	1	0.01	--				
Bald Eagle	1	1	0.00	--				
Ruffed Grouse	2	2	0.01	--				
Blue Grouse	6	6	0.01	**0.01**	53.0	133	<0.01	0.03
Killdeer	1	1	0.00	--				
Spotted Sandpiper	2	1	0.00	**<0.01**	100.3	105	<0.01	0.02
Band-tailed Pigeon	4	4	0.00	**0.03**	53.0	105	0.01	0.09
Barred Owl	1	1	0.01	--				
Vaux's Swift	10	3	0.12	--				
Rufous Hummingbird	18	16	0.22	--				
Belted Kingfisher	0	1	0.00	--				
Downy Woodpecker	1	1	0.01	--				
Hairy Woodpecker	6	6	0.01	**0.04**	45.4	105	0.02	0.11
Northern Flicker	2	2	0.00	**0.01**	71.3	105	<0.01	0.02
Pileated Woodpecker	2	2	0.00	**<0.01**	106.0	105	<0.01	0.01
Olive-sided Flycatcher	3	2	0.02	**0.02**	82.2	105	<0.01	0.07
Hammond's Flycatcher	40	32	0.40	**0.44**	44.1	237	0.19	1.01
Pacific-slope Flycatcher	123	76	0.97	**1.05**	24.1	910	0.66	1.67
Hutton's Vireo	1	1	0.01	--				
Warbling Vireo	40	31	0.16	**0.17**	19.6	143	0.11	0.24
Gray Jay	1	1	0.01	**0.02**	101.0	105	<0.01	0.09
Steller's Jay	23	20	0.11	**0.16**	26.7	177	0.09	0.26
American Crow	11	11	0.00	--				
Common Raven	2	2	0.00	--				
N. Rough-winged Swallow	14	12	0.00	--				
Chestnut-backed Chickadee	0	1	0.00	**0.92**	28.6	592	0.53	1.60
Red-breasted Nuthatch	50	39	0.53	**0.01**	52.4	131	0.01	0.04

Table 9, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Brown Creeper	5	5	0.01	**0.18**	33.6	134	0.09	0.34
Winter Wren	11	10	0.11	**0.86**	13.3	683	0.66	1.11
Golden-crowned Kinglet	140	79	0.83	**1.33**	22.7	376	0.85	2.07
Swainson's Thrush	47	39	0.55	**0.45**	25.4	263	0.27	0.73
American Robin	45	31	0.28	**0.95**	16.1	357	0.70	1.31
Varied Thrush	122	66	0.72	**0.08**	20.7	209	0.05	0.11
Orange-crowned Warbler	38	31	0.01	**0.01**	100.3	105	<0.01	0.04
Yellow Warbler	1	1	0.00	**0.07**	74.9	105	0.02	0.27
Yellow-rumped Warbler	3	2	0.01	**0.05**	72.6	105	0.01	0.18
Black-throated Gray Warbler	2	2	0.02	**0.18**	31.1	174	0.10	0.33
Townsend's Warbler	30	18	0.23	**0.11**	57.4	266	0.04	0.32
MacGillivray's Warbler	20	16	0.16	**0.03**	58.2	105	0.01	0.07
Common Yellowthroat	3	3	0.02	**0.02**	100.6	105	<0.01	0.10
Wilson's Warbler	1	1	0.00	**0.36**	22.2	169	0.23	0.55
Western Tanager	30	25	0.24	**0.14**	25.5	168	0.09	0.23
Spotted Towhee	24	21	0.12	--				
Song Sparrow	2	2	0.01	**0.16**	28.0	155	0.09	0.27
White-crowned Sparrow	21	17	0.12	**0.04**	67.4	105	0.01	0.13
Dark-eyed Junco	6	4	0.00	**0.31**	21.9	136	0.20	0.48
Black-headed Grosbeak	32	24	0.26	**0.04**	58.4	105	0.01	0.12
Red Crossbill	4	4	0.01	**0.16**	72.6	117	0.04	0.58
Pine Siskin	31	4	0.26	**0.12**	70.9	158	0.03	0.42

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 10. Results from 60 point counts at locations classified as Sitka Spruce. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Mallard	1	1	0.00	--				
Unidentified Hawk	1	1	0.00	--				
Blue Grouse	2	2	0.00	**0.01**	72.8	68	<0.01	0.04
California Quail	1	1	0.02	--				
Spotted Sandpiper	1	1	0.02	**<0.01**	100.3	59	<0.01	0.02
Unidentified Gull	2	1	0.00	--				
Vaux's Swift	1	1	0.02	--				
Rufous Hummingbird	6	6	0.13	--				
Belted Kingfisher	3	3	0.02	--				
Downy Woodpecker	1	1	0.02	--				
Hairy Woodpecker	7	5	0.09	**0.09**	52.8	59	0.03	0.25
Northern Flicker	4	4	0.02	**0.02**	50.1	59	0.01	0.05
Pileated Woodpecker	3	3	0.00	**0.01**	66.8	59	<0.01	0.05
Hammond's Flycatcher	11	10	0.17	**0.18**	51.1	222	0.07	0.46
Pacific-slope Flycatcher	85	50	1.25	**1.23**	25.1	689	0.76	2.00
Warbling Vireo	2	2	0.00	**0.02**	70.5	60	<0.01	0.06
Gray Jay	3	3	0.02	**0.09**	58.4	59	0.03	0.27
Steller's Jay	12	10	0.04	**0.11**	41.0	77	0.05	0.24
Common Raven	2	1	0.02	--				
Chestnut-backed Chickadee	54	33	1.08	**1.76**	28.1	477	1.03	3.03
Red-breasted Nuthatch	5	5	0.02	**0.03**	51.9	75	0.01	0.07
Brown Creeper	5	5	0.09	**0.11**	50.1	66	0.04	0.29
Winter Wren	117	52	1.32	**1.26**	13.4	436	0.97	1.64
American Dipper	2	1	0.04	--				
Golden-crowned Kinglet	49	34	1.00	**2.56**	22.6	248	1.65	3.98
Swainson's Thrush	20	14	0.19	**0.39**	31.7	116	0.21	0.73
American Robin	46	29	0.45	**0.71**	20.6	124	0.47	1.06
Varied Thrush	40	33	0.06	**0.14**	17.8	161	0.10	0.20
Yellow Warbler	1	1	0.00	**0.00**				

Table 10, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Black-throated Gray Warbler	8	7	0.09	**0.08**	45.8	86	0.03	0.18
Townsend's Warbler	6	4	0.04	**0.06**	76.5	161	0.02	0.24
Wilson's Warbler	13	10	0.15	**0.22**	37.1	70	0.11	0.45
Western Tanager	4	4	0.02	**0.05**	50.9	70	0.02	0.12
Song Sparrow	4	3	0.04	**0.05**	75.3	63	0.01	0.18
White-crowned Sparrow	2	1	0.00	**0.01**	101.0	59	<0.01	0.07
Dark-eyed Junco	15	14	0.19	**0.25**	26.9	70	0.15	0.42

[1] Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 11. Results from 20 point counts at locations classified as Western Redcedar. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Osprey	1	1	0.06	--				
Marbled Murrelet	1	1	0.00	--				
Band-tailed Pigeon	1	1	0.06	**0.04**	101.9	19	0.01	0.26
Rufous Hummingbird	3	3	0.19	--				
Hairy Woodpecker	2	1	0.06	**0.09**	100.7	19	0.02	0.54
Pileated Woodpecker	1	1	0.00	**0.01**	106.0	19	<0.01	0.08
Hammond's Flycatcher	1	1	0.06	**0.06**	107.9	26	0.01	0.36
Pacific-slope Flycatcher	18	16	0.57	**0.62**	30.3	92	0.35	1.12
Gray Jay	1	1	0.06	**0.09**	101.0	19	0.02	0.53
American Crow	0	1	0.00	--				
Common Raven	2	2	0.00	--				
Chestnut-backed Chickadee	10	8	0.57	**1.02**	39.2	49	0.48	2.17
Red-breasted Nuthatch	3	2	0.06	**0.06**	75.1	21	0.01	0.23
Brown Creeper	2	2	0.06	**0.17**	69.8	20	0.05	0.64
Winter Wren	27	19	0.64	**0.80**	17.0	54	0.57	1.12
Golden-crowned Kinglet	1	1	0.06	**0.16**	101.4	20	0.03	0.95
Swainson's Thrush	2	2	0.00	**0.12**	74.1	22	0.03	0.44
American Robin	5	4	0.00	**0.19**	47.4	22	0.07	0.48
Varied Thrush	4	3	0.00	**0.02**	100.7	20	<0.01	0.12
Orange-crowned Warbler	3	3	0.00	**0.11**	55.2	19	0.04	0.34
Yellow-rumped Warbler	1	1	0.06	**0.13**	101.6	19	0.02	0.75
Common Yellowthroat	1	1	0.00	**0.10**	100.6	19	0.02	0.59
Wilson's Warbler	2	2	0.13	**0.13**	69.7	20	0.04	0.49
Dark-eyed Junco	3	1	0.06	**0.05**	100.3	19	0.01	0.30

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 12. Results from 101 point counts at locations classified as Western Redcedar/Western Hemlock. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Bald Eagle	3	3	0.00	--				
California Quail	1	1	0.01	--				
Band-tailed Pigeon	1	1	0.01	**0.01**	101.9	100	<0.01	0.47
Vaux's Swift	1	1	0.01	--				
Rufous Hummingbird	12	11	0.14	--				
Hairy Woodpecker	4	4	0.04	**0.04**	50.6	100	0.01	0.10
Northern Flicker	2	2	0.01	**0.01**	71.3	100	<0.01	0.02
Pileated Woodpecker	3	3	0.00	**0.01**	67.1	100	<0.01	0.03
Western Wood-Pewee	1	1	0.01	--				
Hammond's Flycatcher	6	5	0.05	**0.05**	63.8	225	0.01	0.15
Pacific-slope Flycatcher	92	63	0.71	**0.70**	25.1	841	0.43	1.14
Hutton's Vireo	3	3	0.04	--				
Warbling Vireo	1	1	0.01	**0.01**	100.3	101	<0.01	0.03
Gray Jay	9	3	0.10	**0.14**	89.4	100	0.03	0.66
Steller's Jay	19	16	0.10	**0.11**	34.9	140	0.06	0.22
American Crow	1	1	0.00	--				
Common Raven	8	5	0.01	--				
Chestnut-backed Chickadee	60	35	0.67	**1.09**	29.7	520	0.61	1.93
Red-breasted Nuthatch	5	5	0.01	**0.02**	47.3	131	0.01	0.05
Brown Creeper	21	16	0.20	**0.36**	27.4	144	0.21	0.60
Winter Wren	137	80	0.69	**0.80**	13.7	583	0.61	1.04
Golden-crowned Kinglet	34	28	0.42	**1.07**	24.6	300	0.66	1.73
Swainson's Thrush	19	15	0.09	**0.20**	34.0	175	0.10	0.38
Hermit Thrush	2	2	0.00	**0.01**	81.8	150	<0.01	0.03
American Robin	38	25	0.21	**0.33**	25.3	159	0.20	0.53
Varied Thrush	30	27	0.01	**0.06**	20.9	196	0.04	0.10
Orange-crowned Warbler	14	11	0.09	**0.10**	31.3	100	0.05	0.18
Townsend's Warbler	4	3	0.01	**0.04**	76.8	243	0.01	0.14
Common Yellowthroat	1	1	0.01	**0.02**	100.6	100	<0.01	0.11

Table 12, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Wilson's Warbler	18	15	0.15	**0.21**	31.1	128	0.11	0.38
Western Tanager	2	1	0.00	**0.01**	101.1	104	<0.01	0.07
Spotted Towhee	3	3	0.04	**--**				
Song Sparrow	1	1	0.00	**0.01**	101.0	104	<0.01	0.05
Dark-eyed Junco	4	4	0.00	**0.02**	70.8	102	0.01	0.07
Black-headed Grosbeak	1	1	0.00	**0.01**	100.7	100	<0.01	0.07
Red Crossbill	7	10	0.06	**0.04**	40.3	144	0.02	0.08

[1] Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 13. Results from 221 point counts at locations classified as West-side Western Hemlock. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Mallard	1	1	0.00	--				
Bald Eagle	2	2	0.00	--				
Blue Grouse	20	19	0.00	**0.03**	30.4	194	0.02	0.05
Killdeer	1	1	0.00	--				
Unidentified Gull	0	1	0.00	--				
Band-tailed Pigeon	5	5	0.01	**0.02**	53.4	220	0.01	0.04
Rufous Hummingbird	15	14	0.09	--				
Belted Kingfisher	4	4	0.00	--				
Downy Woodpecker	2	1	0.01	--				
Hairy Woodpecker	18	14	0.04	**0.07**	30.9	220	0.04	0.12
Northern Flicker	6	4	0.02	**0.01**	58.7	220	<0.01	0.02
Pileated Woodpecker	6	6	0.01	**0.01**	53.5	220	<0.01	0.02
Olive-sided Flycatcher	2	2	0.01	**0.01**	78.8	220	<0.01	0.02
Hammond's Flycatcher	29	26	0.10	**0.13**	46.1	280	0.05	0.31
Pacific-slope Flycatcher	263	158	0.90	**1.03**	23.3	908	0.65	1.61
Cassin's Vireo	1	1	0.01	--				
Hutton's Vireo	2	2	0.01	--				
Warbling Vireo	5	5	0.01	**0.01**	50.2	230	<0.01	0.02
Gray Jay	10	8	0.04	**0.07**	41.6	220	0.03	0.15
Steller's Jay	30	26	0.10	**0.09**	25.1	307	0.06	0.15
American Crow	8	7	0.02	--				
Common Raven	6	5	0.01	--				
Tree Swallow	1	1	0.01	--				
N. Rough-winged Swallow	1	1	0.01	--				
Chestnut-backed Chickadee	166	101	0.83	**1.36**	26.2	702	0.82	2.26
Red-breasted Nuthatch	19	18	0.03	**0.03**	29.8	300	0.02	0.06
Brown Creeper	45	36	0.21	**0.32**	20.6	337	0.21	0.47
Winter Wren	352	182	0.95	**1.01**	12.0	1252	0.80	1.28
American Dipper	1	1	0.01	--				

Table 13, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Golden-crowned Kinglet	102	85	0.52	**1.32**	19.9	577	0.90	1.94
Swainson's Thrush	30	23	0.08	**0.15**	29.7	389	0.08	0.26
Hermit Thrush	2	2	0.00	**0.00**	82.0	271	<0.01	0.01
American Robin	96	67	0.18	**0.35**	17.1	552	0.25	0.48
Varied Thrush	158	115	0.09	**0.14**	14.0	674	0.11	0.19
Orange-crowned Warbler	1	1	0.00	**<0.01**	100.3	220	<0.01	0.02
Black-throated Gray Warbler	11	9	0.01	**0.03**	44.4	287	0.01	0.06
Townsend's Warbler	34	22	0.09	**0.10**	56.7	270	0.03	0.27
Wilson's Warbler	37	27	0.12	**0.20**	24.4	312	0.13	0.32
Western Tanager	12	11	0.02	**0.04**	33.0	283	0.02	0.07
Song Sparrow	6	5	0.01	**0.03**	48.8	253	0.01	0.06
Dark-eyed Junco	33	24	0.06	**0.13**	23.5	274	0.09	0.21
Black-headed Grosbeak	1	1	0.01	**0.01**	100.7	220	<0.01	0.03
Purple Finch	2	2	0.01	**--**				
Red Crossbill	91	28	0.14	**0.19**	31.7	363	0.10	0.35
Pine Siskin	7	4	0.02	**0.06**	76.7	215	0.01	0.22

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 14. Results from 85 point counts at locations classified as East-side Western Hemlock. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Blue Grouse	2	2	0.00	**0.01**	73.0	97	0.00	0.03
Marbled Murrelet	3	1	0.00	--				
Band-tailed Pigeon	3	3	0.01	**0.03**	60.3	84	0.01	0.10
Northern Flicker	2	2	0.00	**0.01**	71.3	84	<0.01	0.02
Pileated Woodpecker	1	1	0.01	**<0.01**	106.0	84	<0.01	0.02
Olive-sided Flycatcher	1	1	0.01	**0.01**	106.0	84	<0.01	0.04
Hammond's Flycatcher	6	6	0.06	**0.07**	59.6	217	0.02	0.21
Pacific-slope Flycatcher	72	45	0.76	**0.77**	25.9	712	0.46	1.26
Warbling Vireo	5	5	0.01	**0.02**	49.7	88	0.01	0.06
Gray Jay	7	5	0.07	**0.11**	53.9	84	0.04	0.29
American Crow	1	1	0.00	--				
Common Raven	4	2	0.03	--				
Black-capped Chickadee	1	1	0.00	--				
Chestnut-backed Chickadee	54	30	0.72	**1.17**	29.6	473	0.66	2.07
Red-breasted Nuthatch	15	12	0.06	**0.05**	40.0	123	0.03	0.12
Brown Creeper	8	7	0.12	**0.16**	40.0	100	0.07	0.35
Winter Wren	53	40	0.43	**0.41**	17.3	224	0.29	0.57
American Dipper	1	1	0.01	--				
Golden-crowned Kinglet	34	29	0.45	**1.12**	24.8	255	0.69	1.81
Swainson's Thrush	9	6	0.03	**0.10**	53.6	105	0.04	0.26
Hermit Thrush	12	10	0.03	**0.05**	53.8	119	0.02	0.13
American Robin	6	6	0.04	**0.07**	41.3	99	0.03	0.15
Varied Thrush	37	29	0.09	**0.08**	22.5	149	0.05	0.12
Yellow Warbler	2	2	0.03	**0.06**	71.0	84	0.02	0.21
Townsend's Warbler	21	4	0.15	**0.13**	56.6	253	0.05	0.37
Wilson's Warbler	2	2	0.00	**0.03**	71.1	88	0.01	0.11
Western Tanager	2	2	0.01	**0.02**	71.8	91	<0.01	0.06
Song Sparrow	1	1	0.00	**0.01**	101.0	87	<0.01	0.06
Dark-eyed Junco	27	19	0.26	**0.29**	28.3	98	0.17	0.50

Table 14, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Black-headed Grosbeak	2	2	0.00	**0.02**	100.7	84	<0.01	0.09
Red Crossbill	17	9	0.10	**0.11**	40.0	122	0.05	0.24
Pine Siskin	4	2	0.04	**0.09**	97.3	152	0.02	0.43

[1] Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 15. Results from 155 point counts at locations classified as Douglas-fir. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Mallard	1	1	0.00					
Blue Grouse	14	14	0.03	**0.03**	32.2	184	0.02	0.06
Spotted Sandpiper	3	2	0.00	**<0.01**	70.9	154	<0.01	0.01
Marbled Murrelet	6	4	0.00	--				
Common Nighthawk	1	1	0.01	--				
Rufous Hummingbird	9	7	0.07	--				
Belted Kingfisher	1	1	0.00	--				
Downy Woodpecker	1	1	0.01	--				
Hairy Woodpecker	3	3	0.01	**0.01**	71.4	154	<0.01	0.04
Northern Flicker	5	5	0.02	**0.01**	45.7	154	<0.01	0.02
Pileated Woodpecker	3	3	0.01	**<0.01**	78.8	154	<0.01	0.01
Olive-sided Flycatcher	5	5	0.00	**0.02**	56.4	154	0.01	0.05
Hammond's Flycatcher	57	42	0.34	**0.39**	43.7	234	0.17	0.89
Pacific-slope Flycatcher	110	69	0.62	**0.62**	25.2	947	0.38	1.02
Warbling Vireo	17	15	0.03	**0.05**	29.0	177	0.03	0.09
Gray Jay	9	7	0.06	**0.11**	41.8	154	0.05	0.24
Steller's Jay	7	7	0.03	**0.03**	39.9	198	0.02	0.07
Common Raven	4	6	0.00	--				
Tree Swallow	2	1	0.02	--				
Chestnut-backed Chickadee	119	70	0.85	**1.39**	27.4	704	0.82	2.36
Red-breasted Nuthatch	18	16	0.06	**0.04**	33.2	235	0.02	0.07
Brown Creeper	24	20	0.15	**0.24**	25.6	226	0.15	0.39
Winter Wren	142	87	0.50	**0.56**	14.7	623	0.42	0.74
American Dipper	1	1	0.01	--				
Golden-crowned Kinglet	61	47	0.48	**1.20**	22.2	497	0.78	1.85
Swainson's Thrush	6	5	0.02	**0.05**	49.8	198	0.02	0.12
Hermit Thrush	9	7	0.03	**0.02**	57.4	155	0.01	0.06
American Robin	42	35	0.11	**0.19**	22.8	270	0.12	0.29
Varied Thrush	81	58	0.05	**0.11**	16.9	422	0.08	0.15

Table 15, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Yellow Warbler	1	1	0.01	**0.02**	100.5	154	<0.01	0.08
Yellow-rumped Warbler	2	2	0.00	**0.02**	101.6	154	<0.01	0.09
Black-throated Gray Warbler	3	3	0.00	**<0.01**	102.0	166	<0.01	0.02
Townsend's Warbler	109	59	0.34	**0.38**	52.8	211	0.14	1.02
MacGillivray's Warbler	4	4	0.01	**0.02**	50.7	154	0.01	0.06
Wilson's Warbler	4	4	0.01	**0.03**	58.4	165	0.01	0.07
Western Tanager	11	10	0.03	**0.05**	34.1	207	0.02	0.09
Spotted Towhee	2	2	0.01	**--**				
Song Sparrow	2	2	0.01	**0.01**	71.9	166	<0.01	0.04
White-crowned Sparrow	4	3	0.02	**0.02**	62.5	154	0.01	0.07
Dark-eyed Junco	74	52	0.34	**0.47**	15.9	252	0.34	0.64
Black-headed Grosbeak	4	3	0.02	**0.04**	62.0	154	0.01	0.11
Red Crossbill	33	13	0.14	**0.09**	37.6	300	0.05	0.19
Pine Siskin	10	5	0.04	**0.08**	76.6	198	0.02	0.31
Evening Grosbeak	1	1	0.00	**--**				

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 16. Results from 15 point counts at locations classified as High-elevation Shrub. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Rufous Hummingbird	1	1	0.09	**--**				
Hairy Woodpecker	1	1	0.09	**0.06**	100.7	14	0.01	0.38
Olive-sided Flycatcher	2	2	0.00	**0.00**				
Hammond's Flycatcher	3	3	0.26	**0.24**	67.1	34	0.07	0.82
Pacific-slope Flycatcher	4	4	0.34	**0.26**	49.7	22	0.10	0.68
Warbling Vireo	6	5	0.42	**0.21**	41.5	15	0.09	0.48
Gray Jay	1	1	0.09	**0.12**	101.0	14	0.02	0.74
Steller's Jay	1	1	0.09	**0.05**	101.1	15	0.01	0.29
Chestnut-backed Chickadee	7	6	0.59	**0.95**	42.9	30	0.41	2.20
Red-breasted Nuthatch	1	1	0.09	**0.03**	101.6	15	0.00	0.16
Winter Wren	11	7	0.59	**0.51**	35.6	17	0.25	1.05
Golden-crowned Kinglet	4	2	0.34	**0.87**	79.2	15	0.20	3.85
Ruby-crowned Kinglet	1	1	0.09	**0.15**	101.6	14	0.02	0.91
Swainson's Thrush	2	1	0.17	**0.16**	101.5	15	0.03	0.95
Hermit Thrush	11	8	0.17	**0.23**	50.3	65	0.09	0.58
American Robin	1	1	0.09	**0.06**	100.7	14	0.01	0.38
Varied Thrush	2	2	0.00	**0.01**	100.7	14	0.00	0.09
Yellow Warbler	1	1	0.09	**0.17**	100.5	14	0.03	1.00
Wilson's Warbler	3	2	0.26	**0.26**	73.2	15	0.06	1.06
Song Sparrow	1	1	0.09	**0.06**	101.0	15	0.01	0.38
Dark-eyed Junco	8	5	0.42	**0.50**	51.3	15	0.18	1.39

[1] Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 17. Results from 84 point counts at locations classified as Pacific Silver Fir. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red-tailed Hawk	2	1	0.03	--				
Blue Grouse	4	4	0.00	**0.01**	60.3	101	0.00	0.04
Marbled Murrelet	1	1	0.01	--				
Rufous Hummingbird	3	2	0.04	--				
Hairy Woodpecker	1	1	0.00	**0.01**	100.7	83	<0.01	0.06
Northern Flicker	2	2	0.00	**<0.01**	100.7	83	<0.01	0.02
Olive-sided Flycatcher	4	3	0.01	**0.03**	70.1	83	0.01	0.10
Hammond's Flycatcher	15	15	0.14	**0.20**	47.5	260	0.08	0.48
Pacific-slope Flycatcher	34	27	0.32	**0.33**	29.3	411	0.19	0.58
Warbling Vireo	1	1	0.00	**0.01**	100.3	84	<0.01	0.03
Gray Jay	8	5	0.11	**0.17**	47.8	83	0.07	0.43
Steller's Jay	1	1	0.00	**0.01**	101.1	87	<0.01	0.05
Black-capped Chickadee	1	1	0.01	--				
Chestnut-backed Chickadee	58	36	0.65	**1.09**	30.0	448	0.61	1.94
Red-breasted Nuthatch	22	15	0.08	**0.10**	33.0	142	0.05	0.18
Brown Creeper	11	10	0.08	**0.14**	38.3	101	0.07	0.30
Winter Wren	79	60	0.59	**0.56**	14.8	363	0.42	0.75
American Dipper	1	1	0.01	--				
Golden-crowned Kinglet	58	42	0.79	**2.03**	23.3	296	1.29	3.19
Ruby-crowned Kinglet	1	1	0.00	**0.03**	101.6	83	<0.01	0.14
Hermit Thrush	24	20	0.01	**0.08**	47.7	89	0.03	0.19
Varied Thrush	92	53	0.17	**0.21**	16.9	251	0.15	0.29
Black-throated Gray Warbler	1	1	0.00	**0.01**	102.0	90	<0.01	0.04
Townsend's Warbler	2	2	0.03	**0.01**	87.0	173	<0.01	0.06
Wilson's Warbler	2	2	0.03	**0.03**	71.1	87	0.01	0.11
Western Tanager	1	1	0.00	**0.01**	101.1	87	<0.01	0.04
Chipping Sparrow	1	1	0.01	--				
Dark-eyed Junco	40	27	0.38	**0.47**	20.9	111	0.31	0.70
Pine Grosbeak	1	1	0.01	**0.03**	100.3	83	0.01	0.18

Table 17, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Crossbill	11	9	0.09	**0.06**	42.3	116	0.03	0.13
Pine Siskin	37	18	0.48	**0.71**	66.0	132	0.22	2.34

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 18. Results from 71 point counts at locations classified as Mountain Hemlock. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Blue Grouse	8	7	0.02	**0.07**	53.8	70	0.03	0.20
Band-tailed Pigeon	2	2	0.00	**<0.01**	71.7	70	<0.01	<0.01
Rufous Hummingbird	9	9	0.16	--				
Hairy Woodpecker	1	1	0.00	**0.02**	101.2	70	<0.01	0.09
Northern Flicker	2	2	0.00	**0.01**	72.0	70	<0.01	0.02
Olive-sided Flycatcher	12	10	0.04	**0.03**	35.6	112	0.02	0.06
Pacific-slope Flycatcher	3	3	0.04	**0.08**	57.6	70	0.03	0.22
Gray Jay	5	4	0.00	**0.03**	53.9	70	0.01	0.09
Common Raven	1	1	0.00	--				
Chestnut-backed Chickadee	12	7	0.21	**0.55**	62.2	157	0.18	1.69
Red-breasted Nuthatch	21	17	0.14	**0.14**	28.0	123	0.08	0.23
Brown Creeper	3	3	0.05	**0.17**	73.6	70	0.05	0.63
Winter Wren	45	36	0.36	**0.44**	16.7	135	0.31	0.61
Golden-crowned Kinglet	34	26	0.57	**1.30**	20.6	100	0.87	1.95
Ruby-crowned Kinglet	2	2	0.00	**0.02**	71.8	70	<0.01	0.06
Townsend's Solitaire	2	2	0.00	**<0.01**	81.3	70	<0.01	0.02
Hermit Thrush	28	20	0.02	**0.07**	44.1	183	0.03	0.16
American Robin	5	5	0.05	**0.06**	51.4	84	0.02	0.15
Varied Thrush	56	32	0.14	**0.14**	30.4	256	0.08	0.25
Dark-eyed Junco	89	52	0.97	**1.56**	14.2	185	1.18	2.06
Pine Grosbeak	3	3	0.02	**0.04**	57.6	70	0.01	0.11
Red Crossbill	13	11	0.14	**0.17**	37.8	91	0.08	0.35
Pine Siskin	55	28	0.59	**1.10**	25.2	221	0.68	1.80

[1] Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 19. Results from nine point counts at locations classified as Lodgepole Pine. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Gray Jay	1	1	0.00	**0.20**	101.0	8	0.03	1.41
Chestnut-backed Chickadee	2	1	0.28	**0.45**	102.9	9	0.07	3.10
Red-breasted Nuthatch	4	4	0.28	**0.17**	43.3	12	0.07	0.43
Golden-crowned Kinglet	6	2	0.85	**2.18**	72.7	9	0.50	9.54
Yellow-rumped Warbler	2	2	0.28	**0.57**	68.5	8	0.14	2.39
Townsend's Warbler	5	3	0.28	**0.21**	71.6	32	0.06	0.77
Dark-eyed Junco	10	5	1.13	**1.18**	44.3	9	0.45	3.10
Red Crossbill	4	1	0.00	**0.25**	101.4	9	0.04	1.67
Pine Siskin	25	5	3.40	**4.83**	96.1	19	0.89	26.30

[1] Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 20. Results from 134 point counts at locations classified as Subalpine Fir. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Northern Goshawk	1	1	0.01	--				
American Kestrel	1	1	0.01	--				
Ruffed Grouse	1	1	0.01	--				
Blue Grouse	5	5	0.03	**0.02**	62.4	132	0.01	0.06
Rufous Hummingbird	3	3	0.03	--				
Hairy Woodpecker	2	2	0.01	**0.02**	72.2	132	0.01	0.07
Northern Flicker	23	22	0.03	**0.03**	27.0	132	0.02	0.06
Olive-sided Flycatcher	8	8	0.01	**0.01**	41.4	181	<0.01	0.02
Hammond's Flycatcher	1	1	0.01	**0.02**	100.4	132	<0.01	0.08
Pacific-slope Flycatcher	3	3	0.03	**0.04**	58.0	132	0.01	0.12
Gray Jay	12	10	0.09	**0.04**	37.4	132	0.02	0.09
Steller's Jay	2	1	0.02	**0.06**	101.2	132	0.01	0.34
Common Raven	1	1	0.00	--				
Horned Lark	1	1	0.00	**0.01**	100.4	132	<0.01	0.03
Chestnut-backed Chickadee	40	24	0.35	**0.87**	52.1	129	0.33	2.30
Red-breasted Nuthatch	65	48	0.28	**0.21**	20.7	260	0.14	0.32
Brown Creeper	2	2	0.02	**0.06**	84.5	132	0.01	0.26
Winter Wren	52	41	0.32	**0.27**	17.5	227	0.19	0.38
Golden-crowned Kinglet	60	36	0.56	**1.30**	21.6	180	0.85	1.99
Ruby-crowned Kinglet	7	7	0.05	**0.03**	39.8	132	0.01	0.07
Townsend's Solitaire	5	5	0.02	**0.01**	60.2	132	<0.01	0.02
Hermit Thrush	33	29	0.06	**0.05**	41.9	173	0.02	0.11
American Robin	14	11	0.09	**0.10**	37.8	176	0.05	0.20
Varied Thrush	38	28	0.06	**0.05**	31.9	316	0.03	0.10
Yellow Warbler	1	1	0.01	**0.02**	101.1	132	<0.01	0.11
Yellow-rumped Warbler	16	15	0.07	**0.15**	30.1	132	0.08	0.27
Song Sparrow	2	2	0.00	**0.04**	74.9	132	0.01	0.15
Dark-eyed Junco	132	81	0.84	**1.23**	13.0	401	0.96	1.59
Red Crossbill	21	12	0.15	**0.13**	48.2	155	0.05	0.33

Table 20, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Pine Siskin	168	44	1.38	**1.81**	35.6	218	0.92	3.58
Evening Grosbeak	1	1	0.00	--				

[1] Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 21. Results from 203 point counts at locations classified as Meadow/Heather. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Blue Grouse	7	7	0.01	**0.02**	55.5	202	0.01	0.05
Band-tailed Pigeon	1	1	0.00	**<0.01**	101.1	202	<0.01	<0.01
Rufous Hummingbird	38	24	0.24	--				
Northern Flicker	17	15	0.01	**0.02**	31.4	202	0.01	0.03
Olive-sided Flycatcher	29	25	0.01	**0.02**	28.5	205	0.01	0.04
Hammond's Flycatcher	6	6	0.02	**0.05**	45.2	202	0.02	0.12
Pacific-slope Flycatcher	5	4	0.01	**0.04**	61.7	202	0.01	0.11
Warbling Vireo	3	3	0.02	**0.03**	59.6	202	0.01	0.09
Gray Jay	11	9	0.03	**0.02**	42.1	202	0.01	0.05
Horned Lark	12	7	0.03	**0.04**	49.5	202	0.02	0.10
Black-capped Chickadee	1	1	0.00	--				
Chestnut-backed Chickadee	28	13	0.18	**0.41**	64.9	236	0.13	1.33
Red-breasted Nuthatch	46	33	0.04	**0.09**	24.8	327	0.06	0.15
Brown Creeper	2	2	0.01	**0.04**	84.6	202	0.01	0.17
Winter Wren	61	49	0.13	**0.18**	16.7	341	0.13	0.25
American Dipper	2	2	0.01	--				
Golden-crowned Kinglet	70	41	0.34	**0.84**	20.0	284	0.57	1.24
Ruby-crowned Kinglet	11	10	0.01	**0.03**	39.2	202	0.01	0.06
Townsend's Solitaire	17	13	0.03	**0.01**	50.7	202	<0.01	0.03
Hermit Thrush	52	43	0.01	**0.04**	41.4	168	0.02	0.09
American Robin	15	14	0.03	**0.06**	31.2	257	0.03	0.11
Varied Thrush	82	61	0.03	**0.06**	28.5	282	0.04	0.11
American Pipit	20	13	0.07	**0.10**	33.6	258	0.05	0.19
Orange-crowned Warbler	1	1	0.01	**0.00**				
Yellow Warbler	1	1	0.01	**0.01**	101.1	202	<0.01	0.07
Yellow-rumped Warbler	14	14	0.04	**0.09**	29.8	202	0.05	0.16
Townsend's Warbler	2	2	0.01	**0.02**	72.0	202	<0.01	0.06
Wilson's Warbler	1	1	0.01	**0.01**	101.1	202	<0.01	0.07
Chipping Sparrow	6	5	0.02	--				

Table 21, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Song Sparrow	5	4	0.03	**0.07**	58.5	202	0.02	0.20
Dark-eyed Junco	237	137	0.70	**1.43**	11.6	665	1.14	1.80
Pine Grosbeak	14	12	0.01	**0.05**	33.9	202	0.03	0.10
Red Crossbill	46	30	0.13	**0.17**	25.1	286	0.11	0.28
Pine Siskin	330	82	0.80	**2.10**	32.4	369	1.13	3.90

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 22. Results from 84 point counts at locations classified as Rock. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Common Merganser	1	1	0.01	--				
Blue Grouse	5	4	0.04	**0.03**	71.6	83	0.01	0.11
Rufous Hummingbird	5	5	0.08	--				
Northern Flicker	4	3	0.00	**0.01**	62.6	83	<0.01	0.03
Olive-sided Flycatcher	8	8	0.01	**0.02**	38.7	125	0.01	0.04
Hammond's Flycatcher	1	1	0.00	**0.03**	100.4	83	<0.01	0.13
Pacific-slope Flycatcher	1	1	0.00	**0.02**	100.4	83	<0.01	0.11
Warbling Vireo	3	2	0.01	**0.07**	75.8	83	0.02	0.27
Gray Jay	5	5	0.00	**0.02**	51.2	83	0.01	0.06
American Crow	0	1	0.00	--				
Horned Lark	4	2	0.06	**0.04**	70.9	83	0.01	0.14
N. Rough-winged Swallow	3	1	0.04	--				
Chestnut-backed Chickadee	8	5	0.08	**0.19**	70.0	167	0.06	0.67
Red-breasted Nuthatch	9	8	0.00	**0.02**	58.9	94	0.01	0.05
Winter Wren	11	8	0.06	**0.08**	42.9	91	0.03	0.17
American Dipper	1	1	0.01	--				
Golden-crowned Kinglet	9	8	0.01	**0.14**	49.8	88	0.05	0.35
Ruby-crowned Kinglet	3	3	0.00	**0.01**	71.8	83	<0.01	0.05
Townsend's Solitaire	7	7	0.01	**0.01**	57.0	83	<0.01	0.03
Swainson's Thrush	4	4	0.00	**0.02**	68.6	83	<0.01	0.05
Hermit Thrush	20	18	0.00	**0.04**	44.7	192	0.02	0.09
American Robin	19	13	0.15	**0.20**	33.8	122	0.10	0.38
Varied Thrush	10	9	0.00	**0.02**	41.7	181	0.01	0.05
American Pipit	31	18	0.27	**0.36**	29.8	135	0.20	0.64
Yellow Warbler	2	1	0.01	**0.06**	101.1	83	0.01	0.34
Yellow-rumped Warbler	7	6	0.01	**0.10**	42.3	83	0.04	0.22
Townsend's Warbler	2	1	0.01	**0.02**	101.1	83	<0.01	0.10
Common Yellowthroat	1	1	0.00	**0.02**	100.4	83	<0.01	0.12
Wilson's Warbler	2	2	0.00	**0.07**	71.8	83	0.02	0.24

Table 22, continued

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Song Sparrow	3	2	0.00	**0.10**	78.5	83	0.02	0.39
White-crowned Sparrow	5	3	0.03	**0.21**	82.8	83	0.05	0.88
Dark-eyed Junco	62	46	0.35	**0.81**	15.7	179	0.60	1.10
Red Crossbill	7	5	0.04	**0.07**	58.7	93	0.02	0.19
Pine Siskin	180	25	0.82	**2.87**	63.3	96	0.91	9.08

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 23. Results from 49 point counts at locations classified as Snow. An entry of '--' for the Adjusted Density Estimate indicates a species for which we did not model detectability.

Species[1]	No. of Non-flyover Detections[2]	No. of Points with Detections[3]	Unadjusted Density (birds/ha)[4]	Adjusted Density[5]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Blue Grouse	2	2	0.00	**0.03**	79.7	48	0.01	0.11
Northern Flicker	4	4	0.03	**0.02**	50.9	48	0.01	0.05
Olive-sided Flycatcher	6	5	0.00	**0.02**	49.1	64	0.01	0.06
Pacific-slope Flycatcher	5	5	0.00	**0.15**	49.3	48	0.06	0.38
Chestnut-backed Chickadee	6	3	0.13	**0.33**	85.3	89	0.08	1.43
Red-breasted Nuthatch	3	3	0.00	**0.03**	58.4	55	0.01	0.08
Winter Wren	19	15	0.08	**0.20**	32.0	57	0.11	0.38
Golden-crowned Kinglet	11	6	0.23	**0.65**	44.4	52	0.28	1.52
Ruby-crowned Kinglet	7	6	0.03	**0.08**	43.4	48	0.04	0.19
Townsend's Solitaire	3	3	0.03	**0.01**	69.8	48	<0.01	0.04
Hermit Thrush	6	6	0.00	**0.02**	57.3	124	0.01	0.06
American Robin	5	4	0.08	**0.10**	53.8	57	0.04	0.28
Varied Thrush	20	15	0.05	**0.06**	36.3	148	0.03	0.13
American Pipit	13	9	0.13	**0.19**	52.1	59	0.07	0.51
Yellow-rumped Warbler	2	2	0.00	**0.00**				
Dark-eyed Junco	34	23	0.34	**0.71**	23.8	65	0.44	1.13
Gray-crowned Rosy-Finch	1	1	0.03	**--**				
Red Crossbill	11	10	0.10	**0.17**	37.0	64	0.08	0.35
Pine Siskin	43	11	0.81	**1.07**	72.1	54	0.29	3.90

[1]Includes all species detected during point counts in the habitat.
[2] Number of individual birds detected at any distance during point counts, excluding flyovers.
[3] Number of points where the species was detected, including flyovers.
[4] Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[5] Estimates and statistics calculated using the software Distance 4.0 Release 2 (Thomas et al. 2003). See Methods for details.

Table 24. Habitat-specific density estimates of Blue Grouse at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	2	5.7	0.01	**0.01**	53.0	133	<0.01	0.03
Low-elevation Shrub	4	9.0	0.03	**0.03**	32.2	184	0.02	0.06
Low Elevation Meadow	0							
Conifer Deciduous Mix	6	2.4	0.00	**0.01**	73.0	97	<0.01	0.03
Sitka Spruce	2	10.5	0.07	**0.02**	101.9	19	<0.01	0.10
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	20	13.8	0.04	**0.05**	51.1	38	0.02	0.12
East-side Western Hemlock	2	3.4	0.01	**0.02**	55.5	202	0.01	0.05
Douglas-fir	14	9.9	0.02	**0.07**	53.8	70	0.03	0.20
High-elevation Shrub	0							
Pacific Silver Fir	4	4.8	0.00	**0.01**	60.3	101	<0.01	0.04
Mountain Hemlock	8	4.8	0.04	**0.03**	71.6	83	0.01	0.11
Lodgepole Pine	0							
Subalpine Fir	5	3.3	0.00	**0.01**	72.8	68	<0.01	0.04
Meadow/Heather	7	4.1	0.00	**0.03**	79.7	48	0.01	0.11
Rock	5	3.7	0.03	**0.02**	62.4	132	0.01	0.06
Snow	2	8.6	0.00	**0.03**	30.4	194	0.02	0.05

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 25. Habitat-specific density estimates of Spotted Sandpiper at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	1	2.6	0.00	**<0.01**	100.3	38	<0.01	0.02
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	2	6.9	0.00	**0.01**	69.9	28	<0.01	0.04
Low Elevation Meadow	5	20.0	1.02	**7.35**	100.4	4	0.72	74.63
Conifer Deciduous Mix	2	0.9	0.00	**<0.01**	100.3	105	<0.01	0.02
Sitka Spruce	1	1.7	0.02	**<0.01**	100.3	59	<0.01	0.02
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	0							
Douglas-fir	3	1.3	0.00	**<0.01**	70.9	154	<0.01	0.01
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	0							
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 26. Habitat-specific density estimates of Band-tailed Pigeon at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	3	7.7	0.03	**0.05**	72.5	38	0.01	0.17
Bigleaf Maple	0							
Hardwood Forest Mix	0							
Low-elevation Shrub	4	13.8	0.09	**0.12**	51.1	28	0.05	0.33
Low Elevation Meadow	1	20.0	0.00	**0.01**	101.1	4	<0.01	0.13
Conifer Deciduous Mix	4	3.8	0.00	**0.03**	53.0	105	0.01	0.09
Sitka Spruce	0							
Western Redcedar	1	5.0	0.06	**0.04**	101.9	19	0.01	0.26
Western Redcedar/Western Hemlock	1	1.0	0.01	**0.01**	101.9	100	<0.01	0.47
West-side Western Hemlock	5	2.3	0.01	**0.02**	53.4	220	0.01	0.04
East-side Western Hemlock	3	3.5	0.01	**0.03**	60.3	84	0.01	0.10
Douglas-fir	0							
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	2	2.8	0.00	**<0.01**	71.7	70	<0.01	0.01
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	1	0.5	0.00	**<0.01**	101.1	202	<0.01	<0.01
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 27. Habitat-specific density estimates of Hairy Woodpecker at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	2	5.1	0.03	**0.05**	70.8	38	0.01	0.18
Bigleaf Maple	0							
Bigleaf Maple	2	10.5	0.13	**0.09**	69.7	18	0.03	0.37
Hardwood Mix Forest	3	15.8	0.13	**0.15**	55.7	18	0.05	0.44
Low-elevation Shrub	1	3.4	0.04	**0.03**	100.7	28	0.01	0.18
Low Elevation Meadow	0							
Conifer Deciduous Mix	6	5.7	0.01	**0.04**	45.4	105	0.02	0.11
Sitka Spruce	7	8.3	0.09	**0.09**	52.8	59	0.03	0.25
Western Redcedar	2	5.0	0.06	**0.09**	100.7	19	0.02	0.54
Western Redcedar/Western Hemlock	4	4.0	0.04	**0.04**	50.6	100	0.01	0.10
West-side Western Hemlock	18	6.3	0.04	**0.07**	30.9	220	0.04	0.12
East-side Western Hemlock	0							
Douglas-fir	3	1.9	0.01	**0.01**	71.4	154	<0.01	0.04
High-elevation Shrub	1	6.7	0.09	**0.06**	100.7	14	0.01	0.38
Pacific Silver Fir	1	1.2	0.00	**0.01**	100.7	83	<0.01	0.06
Mountain Hemlock	1	1.4	0.00	**0.02**	101.2	70	<0.01	0.09
Lodgepole Pine	0							
Subalpine Fir	2	1.5	0.01	**0.02**	72.2	132	0.01	0.07
Meadow/Heather	0							
Rock	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 28. Habitat-specific density estimates of Northern Flicker at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	1	5.3	0.00	**0.00**				
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	0							
Low Elevation Meadow	2	1.9	0.00	**0.01**	71.3	105	<0.01	0.02
Conifer Deciduous Mix	4	6.7	0.02	**0.02**	50.1	59	0.01	0.05
Sitka Spruce	0							
Western Redcedar	2	2.0	0.01	**0.01**	71.3	100	<0.01	0.02
Western Redcedar/Western Hemlock	6	1.8	0.02	**0.01**	58.7	220	<0.01	0.02
West-side Western Hemlock	2	2.4	0.00	**0.01**	71.3	84	<0.01	0.02
East-side Western Hemlock	5	3.2	0.02	**0.01**	45.7	154	<0.01	0.02
Douglas-fir	0							
High-elevation Shrub	2	2.4	0.00	**<0.01**	100.7	83	<0.01	0.02
Pacific Silver Fir	2	2.8	0.00	**0.01**	72.0	70	<0.01	0.02
Mountain Hemlock	0							
Lodgepole Pine	23	16.4	0.03	**0.03**	27.0	132	0.02	0.06
Subalpine Fir	17	7.4	0.01	**0.02**	31.4	202	0.01	0.03
Meadow/Heather	4	3.6	0.00	**0.01**	62.6	83	<0.01	0.03
Rock	4	8.2	0.03	**0.02**	50.9	48	0.01	0.05
Snow	1	5.3	0.00	**0.00**				

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 29. Habitat-specific density estimates of Pileated Woodpecker at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder								
Bigleaf Maple	1	5.3	0.00	**0.01**	106.0	18	<0.01	0.09
Hardwood Mix Forest	2	10.5	0.00	**0.03**	77.2	18	0.01	0.12
Low-elevation Shrub	1	3.4	0.00	**0.01**	106.0	28	<0.01	0.06
Low Elevation Meadow	1	20.0	0.00	**0.13**	101.2	4	0.01	0.30
Conifer Deciduous Mix	2	1.9	0.00	**<0.01**	106.0	105	<0.01	0.01
Sitka Spruce	3	5.0	0.00	**0.01**	66.8	59	<0.01	0.05
Western Redcedar	1	5.0	0.00	**0.01**	106.0	19	<0.01	0.08
Western Redcedar/Western Hemlock	3	3.0	0.00	**0.01**	67.1	100	<0.01	0.03
West-side Western Hemlock	6	2.7	0.01	**0.01**	53.5	220	<0.01	0.02
East-side Western Hemlock	1	1.2	0.01	**<0.01**	106.0	84	<0.01	0.02
Douglas-fir	3	1.9	0.01	**<0.01**	78.8	154	<0.01	0.01
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	0							
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 30. Habitat-specific density estimates of Olive-sided Flycatcher at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	1	5.3	0.00	**0.03**	106.0	18	0.01	0.20
Low-elevation Shrub	1	3.4	0.00	**0.02**	106.0	28	<0.01	0.12
Low Elevation Meadow	0							
Conifer Deciduous Mix	3	1.9	0.02	**0.02**	82.2	105	<0.01	0.07
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	2	0.9	0.01	**0.01**	78.8	220	<0.01	0.02
East-side Western Hemlock	1	1.2	0.01	**0.01**	106.0	84	<0.01	0.04
Douglas-fir	5	3.2	0.00	**0.02**	56.4	154	0.01	0.05
High-elevation Shrub	2	13.3	0.00	**0.00**				
Pacific Silver Fir	4	3.6	0.01	**0.03**	70.1	83	0.01	0.10
Mountain Hemlock	12	14.1	0.04	**0.03**	35.6	112	0.02	0.06
Lodgepole Pine	0							
Subalpine Fir	8	6.0	0.01	**0.01**	41.4	181	<0.01	0.02
Meadow/Heather	29	12.3	0.01	**0.02**	28.5	205	0.01	0.04
Rock	8	9.5	0.01	**0.02**	38.7	125	0.01	0.04
Snow	6	10.2	0.00	**0.02**	49.1	64	0.01	0.06

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 31. Habitat-specific density estimates of Hammond's Flycatcher at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	18	30.8	0.46	**0.55**	49.0	192	0.22	1.37
Bigleaf Maple	7	26.3	0.34	**0.38**	63.5	49	0.12	1.21
Hardwood Mix Forest	7	26.3	0.40	**0.38**	63.5	49	0.12	1.21
Low-elevation Shrub	3	10.3	0.09	**0.12**	68.9	63	0.04	0.43
Low Elevation Meadow	0							
Conifer Deciduous Mix	40	30.2	0.40	**0.44**	44.1	237	0.19	1.01
Sitka Spruce	11	16.7	0.17	**0.18**	51.1	222	0.07	0.46
Western Redcedar	1	5.0	0.06	**0.06**	107.9	26	0.01	0.36
Western Redcedar/Western Hemlock	6	5.0	0.05	**0.05**	63.8	225	0.01	0.15
West-side Western Hemlock	29	11.8	0.10	**0.13**	46.1	280	0.05	0.31
East-side Western Hemlock	6	7.1	0.06	**0.07**	59.6	217	0.02	0.21
Douglas-fir	57	27.1	0.34	**0.39**	43.7	234	0.17	0.89
High-elevation Shrub	3	20.0	0.26	**0.24**	67.1	34	0.07	0.82
Pacific Silver Fir	15	17.9	0.14	**0.20**	47.5	260	0.08	0.48
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	1	0.7	0.01	**0.02**	100.4	132	<0.01	0.08
Meadow/Heather	6	3.0	0.02	**0.05**	45.2	202	0.02	0.12
Rock	1	1.2	0.00	**0.03**	100.4	83	0.00	0.13
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 32. Habitat-specific density estimates of Pacific-slope Flycatcher at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	49	79.5	1.37	**1.20**	25.2	545	0.74	1.96
Bigleaf Maple	12	52.6	0.47	**0.45**	40.6	37	0.21	1.00
Hardwood Mix Forest	16	57.9	0.60	**0.76**	32.1	68	0.40	1.41
Low-elevation Shrub	19	55.2	0.40	**0.53**	32.3	104	0.28	0.99
Low Elevation Meadow	4	60.0	0.51	**1.45**	47.6	4	0.41	5.09
Conifer Deciduous Mix	123	71.7	0.97	**1.05**	24.1	910	0.66	1.67
Sitka Spruce	85	83.3	1.25	**1.23**	25.1	689	0.76	2.00
Western Redcedar	18	80.0	0.57	**0.62**	30.3	92	0.35	1.12
Western Redcedar/Western Hemlock	92	62.4	0.71	**0.70**	25.1	841	0.43	1.14
West-side Western Hemlock	263	71.5	0.90	**1.03**	23.3	908	0.65	1.61
East-side Western Hemlock	72	52.9	0.76	**0.77**	25.9	712	0.46	1.26
Douglas-fir	110	44.5	0.62	**0.62**	25.2	947	0.38	1.02
High-elevation Shrub	4	26.7	0.34	**0.26**	49.7	22	0.10	0.68
Pacific Silver Fir	34	32.1	0.32	**0.33**	29.3	411	0.19	0.58
Mountain Hemlock	3	4.2	0.04	**0.08**	57.6	70	0.03	0.22
Lodgepole Pine	0							
Subalpine Fir	3	2.2	0.03	**0.04**	58.0	132	0.01	0.12
Meadow/Heather	5	2.0	0.01	**0.04**	61.7	202	0.01	0.11
Rock	1	1.2	0.00	**0.02**	100.4	83	<0.01	0.11
Snow	5	10.2	0.00	**0.15**	49.3	48	0.06	0.38

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 33. Habitat-specific density estimates of Warbling Vireo at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	30	56.4	0.42	**0.36**	20.0	52	0.24	0.53
Bigleaf Maple	12	52.6	0.07	**0.30**	28.5	21	0.17	0.53
Hardwood Mix Forest	17	68.4	0.34	**0.43**	20.3	24	0.29	0.66
Low-elevation Shrub	11	31.0	0.18	**0.20**	31.4	32	0.10	0.36
Low Elevation Meadow	2	40.0	0.00	**0.39**	101.2	4	0.04	4.02
Conifer Deciduous Mix	40	29.2	0.16	**0.17**	19.6	143	0.11	0.24
Sitka Spruce	2	3.3	0.00	**0.02**	70.5	60	<0.01	0.06
Western Redcedar	0							
Western Redcedar/Western Hemlock	1	1.0	0.01	**0.01**	100.3	101	<0.01	0.03
West-side Western Hemlock	5	2.3	0.01	**0.01**	50.2	230	<0.01	0.02
East-side Western Hemlock	5	5.9	0.01	**0.02**	49.7	88	0.01	0.06
Douglas-fir	17	9.7	0.03	**0.05**	29.0	177	0.03	0.09
High-elevation Shrub	6	33.3	0.42	**0.21**	41.5	15	0.09	0.48
Pacific Silver Fir	1	1.2	0.00	**0.01**	100.3	84	<0.01	0.03
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	3	1.5	0.02	**0.03**	59.6	202	0.01	0.09
Rock	3	2.4	0.01	**0.07**	75.8	83	0.02	0.27
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 34. Habitat-specific density estimates of Gray Jay at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	0							
Low Elevation Meadow	0							
Conifer Deciduous Mix	1	0.9	0.01	**0.02**	101.0	105	<0.01	0.09
Sitka Spruce	3	5.0	0.02	**0.09**	58.4	59	0.03	0.27
Western Redcedar	1	5.0	0.06	**0.09**	101.0	19	0.02	0.53
Western Redcedar/Western Hemlock	9	3.0	0.10	**0.14**	89.4	100	0.03	0.66
West-side Western Hemlock	10	3.6	0.04	**0.07**	41.6	220	0.03	0.15
East-side Western Hemlock	7	5.9	0.07	**0.11**	53.9	84	0.04	0.29
Douglas-fir	9	4.5	0.06	**0.11**	41.8	154	0.05	0.24
High-elevation Shrub	1	6.7	0.09	**0.12**	101.0	14	0.02	0.74
Pacific Silver Fir	8	6.0	0.11	**0.17**	47.8	83	0.07	0.43
Mountain Hemlock	5	5.6	0.00	**0.03**	53.9	70	0.01	0.09
Lodgepole Pine	1	11.1	0.00	**0.20**	101.0	8	0.03	1.41
Subalpine Fir	12	7.5	0.09	**0.04**	37.4	132	0.02	0.09
Meadow/Heather	11	4.4	0.03	**0.02**	42.1	202	0.01	0.05
Rock	5	6.0	0.00	**0.02**	51.2	83	0.01	0.06
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 35. Habitat-specific density estimates of Steller's Jay at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	2	5.1	0.07	**0.04**	71.3	41	0.01	0.13
Bigleaf Maple	1	5.3	0.07	**0.04**	101.1	19	0.01	0.22
Hardwood Mix Forest	1	5.3	0.00	**0.04**	101.1	19	0.01	0.22
Low-elevation Shrub	4	13.8	0.04	**0.07**	57.5	32	0.02	0.22
Low Elevation Meadow	0							
Conifer Deciduous Mix	23	18.9	0.11	**0.16**	26.7	177	0.09	0.26
Sitka Spruce	12	16.7	0.04	**0.11**	41.0	77	0.05	0.24
Western Redcedar	0							
Western Redcedar/Western Hemlock	19	15.8	0.10	**0.11**	34.9	140	0.06	0.22
West-side Western Hemlock	30	11.8	0.10	**0.09**	25.1	307	0.06	0.15
East-side Western Hemlock	0							
Douglas-fir	7	4.5	0.03	**0.03**	39.9	198	0.02	0.07
High-elevation Shrub	1	6.7	0.09	**0.05**	101.1	15	0.01	0.29
Pacific Silver Fir	1	1.2	0.00	**0.01**	101.1	87	<0.01	0.05
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	2	0.7	0.02	**0.06**	101.2	132	0.01	0.34
Meadow/Heather	0							
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 36. Habitat-specific density estimates of Horned Lark at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	0							
Low Elevation Meadow	0							
Conifer Deciduous Mix	0							
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	0							
East-side Western Hemlock	0							
Douglas-fir	0							
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	1	0.7	0.00	**0.01**	100.4	132	<0.01	0.03
Meadow/Heather	12	3.4	0.03	**0.04**	49.5	202	0.02	0.10
Rock	4	2.4	0.06	**0.04**	70.9	83	0.01	0.14
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 37. Habitat-specific density estimates of Chestnut-backed Chickadee at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	12	15.4	0.39	**0.63**	51.1	63	0.24	1.64
Bigleaf Maple	10	36.8	0.54	**0.86**	44.9	36	0.36	2.04
Hardwood Mix Forest	3	15.8	0.13	**0.21**	72.9	23	0.06	0.83
Low-elevation Shrub	10	24.1	0.40	**0.70**	45.8	54	0.29	1.68
Low Elevation Meadow	3	40.0	0.76	**1.94**	81.4	9	0.38	9.78
Conifer Deciduous Mix	50	36.8	0.53	**0.92**	28.6	592	0.53	1.60
Sitka Spruce	54	55.0	1.08	**1.76**	28.1	477	1.03	3.03
Western Redcedar	10	40.0	0.57	**1.02**	39.2	49	0.48	2.17
Western Redcedar/Western Hemlock	60	34.7	0.67	**1.09**	29.7	520	0.61	1.93
West-side Western Hemlock	166	45.7	0.83	**1.36**	26.2	702	0.82	2.26
East-side Western Hemlock	54	35.3	0.72	**1.17**	29.6	473	0.66	2.07
Douglas-fir	119	45.2	0.85	**1.39**	27.4	704	0.82	2.36
High-elevation Shrub	7	40.0	0.59	**0.95**	42.9	30	0.41	2.20
Pacific Silver Fir	58	42.9	0.65	**1.09**	30.0	448	0.61	1.94
Mountain Hemlock	12	9.9	0.21	**0.55**	62.2	157	0.18	1.69
Lodgepole Pine	2	11.1	0.28	**0.45**	102.9	9	0.07	3.10
Subalpine Fir	40	17.9	0.35	**0.87**	52.1	129	0.33	2.30
Meadow/Heather	28	6.4	0.18	**0.41**	64.9	236	0.13	1.33
Rock	8	6.0	0.08	**0.19**	70.0	167	0.06	0.67
Snow	6	6.1	0.13	**0.33**	85.3	89	0.08	1.43

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 38. Habitat-specific density estimates of Red-breasted Nuthatch at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	1	3.4	0.00	**0.01**	101.6	30	<0.01	0.07
Low Elevation Meadow	0							
Conifer Deciduous Mix	5	4.7	0.01	**0.01**	52.4	131	0.01	0.04
Sitka Spruce	5	8.3	0.02	**0.03**	51.9	75	0.01	0.07
Western Redcedar	3	10.0	0.06	**0.06**	75.1	21	0.01	0.23
Western Redcedar/Western Hemlock	5	5.0	0.01	**0.02**	47.3	131	0.01	0.05
West-side Western Hemlock	19	8.1	0.03	**0.03**	29.8	300	0.02	0.06
East-side Western Hemlock	15	14.1	0.06	**0.05**	40.0	123	0.03	0.12
Douglas-fir	18	10.3	0.06	**0.04**	33.2	235	0.02	0.07
High-elevation Shrub	1	6.7	0.09	**0.03**	101.6	15	<0.01	0.16
Pacific Silver Fir	22	17.9	0.08	**0.10**	33.0	142	0.05	0.18
Mountain Hemlock	21	23.9	0.14	**0.14**	28.0	123	0.08	0.23
Lodgepole Pine	4	44.4	0.28	**0.17**	43.3	12	0.07	0.43
Subalpine Fir	65	35.8	0.28	**0.21**	20.7	260	0.14	0.32
Meadow/Heather	46	16.3	0.04	**0.09**	24.8	327	0.06	0.15
Rock	9	9.5	0.00	**0.02**	58.9	94	0.01	0.05
Snow	3	6.1	0.00	**0.03**	58.4	55	0.01	0.08

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 39. Habitat-specific density estimates of Brown Creeper at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	1	2.6	0.03	**0.04**	100.7	39	0.01	0.24
Bigleaf Maple	0							
Hardwood Mix Forest	1	5.3	0.07	**0.09**	100.7	19	0.02	0.52
Low-elevation Shrub	0							
Low Elevation Meadow	0							
Conifer Deciduous Mix	11	9.4	0.11	**0.18**	33.6	134	0.09	0.34
Sitka Spruce	5	8.3	0.09	**0.11**	50.1	66	0.04	0.29
Western Redcedar	2	10.0	0.06	**0.17**	69.8	20	0.05	0.64
Western Redcedar/Western Hemlock	21	15.8	0.20	**0.36**	27.4	144	0.21	0.60
West-side Western Hemlock	45	16.3	0.21	**0.32**	20.6	337	0.21	0.47
East-side Western Hemlock	8	8.2	0.12	**0.16**	40.0	100	0.07	0.35
Douglas-fir	24	12.9	0.15	**0.24**	25.6	226	0.15	0.39
High-elevation Shrub	0							
Pacific Silver Fir	11	11.9	0.08	**0.14**	38.3	101	0.07	0.30
Mountain Hemlock	3	4.2	0.05	**0.17**	73.6	70	0.05	0.63
Lodgepole Pine	0							
Subalpine Fir	2	1.5	0.02	**0.06**	84.5	132	0.01	0.26
Meadow/Heather	2	1.0	0.01	**0.04**	84.6	202	0.01	0.17
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 40. Habitat-specific density estimates of Winter Wren at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	41	59.0	0.69	**0.64**	20.7	73	0.43	0.96
Bigleaf Maple	15	52.6	0.47	**0.51**	29.3	24	0.28	0.92
Hardwood Mix Forest	20	68.4	0.67	**0.66**	25.9	27	0.39	1.11
Low-elevation Shrub	14	44.8	0.13	**0.29**	27.7	39	0.17	0.50
Low Elevation Meadow	2	40.0	0.00	**0.28**	61.9	4	0.06	1.33
Conifer Deciduous Mix	140	74.5	0.83	**0.86**	13.3	683	0.66	1.11
Sitka Spruce	117	86.7	1.32	**1.26**	13.4	436	0.97	1.64
Western Redcedar	27	95.0	0.64	**0.80**	17.0	54	0.57	1.12
Western Redcedar/Western Hemlock	137	79.2	0.69	**0.80**	13.7	583	0.61	1.04
West-side Western Hemlock	352	82.4	0.95	**1.01**	12.0	1252	0.80	1.28
East-side Western Hemlock	53	47.1	0.43	**0.41**	17.3	224	0.29	0.57
Douglas-fir	142	56.1	0.50	**0.56**	14.7	623	0.42	0.74
High-elevation Shrub	11	46.7	0.59	**0.51**	35.6	17	0.25	1.05
Pacific Silver Fir	79	71.4	0.59	**0.56**	14.8	363	0.42	0.75
Mountain Hemlock	45	50.7	0.36	**0.44**	16.7	135	0.31	0.61
Lodgepole Pine	0							
Subalpine Fir	52	30.6	0.32	**0.27**	17.5	227	0.19	0.38
Meadow/Heather	61	24.1	0.13	**0.18**	16.7	341	0.13	0.25
Rock	11	9.5	0.06	**0.08**	42.9	91	0.03	0.17
Snow	19	30.6	0.08	**0.20**	32.0	57	0.11	0.38

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 41. Habitat-specific density estimates of Golden-crowned Kinglet at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	15	28.2	0.49	**1.18**	35.8	63	0.59	2.35
Bigleaf Maple	2	10.5	0.13	**0.34**	70.8	20	0.09	1.30
Hardwood Mix Forest	3	15.8	0.20	**0.52**	57.0	22	0.17	1.56
Low-elevation Shrub	3	6.9	0.13	**0.34**	75.4	31	0.09	1.33
Low Elevation Meadow	2	40.0	0.26	**0.58**	100.4	4	0.06	5.79
Conifer Deciduous Mix	47	36.8	0.55	**1.33**	22.7	376	0.85	2.07
Sitka Spruce	49	56.7	1.00	**2.56**	22.6	248	1.65	3.98
Western Redcedar	1	5.0	0.06	**0.16**	101.4	20	0.03	0.95
Western Redcedar/Western Hemlock	34	27.7	0.42	**1.07**	24.6	300	0.66	1.73
West-side Western Hemlock	102	38.5	0.52	**1.32**	19.9	577	0.90	1.94
East-side Western Hemlock	34	34.1	0.45	**1.12**	24.8	255	0.69	1.81
Douglas-fir	61	30.3	0.48	**1.20**	22.2	497	0.78	1.85
High-elevation Shrub	4	13.3	0.34	**0.87**	79.2	15	0.20	3.85
Pacific Silver Fir	58	50.0	0.79	**2.03**	23.3	296	1.29	3.19
Mountain Hemlock	34	36.6	0.57	**1.30**	20.6	100	0.87	1.95
Lodgepole Pine	6	22.2	0.85	**2.18**	72.7	9	0.50	9.54
Subalpine Fir	60	26.9	0.56	**1.30**	21.6	180	0.85	1.99
Meadow/Heather	70	20.2	0.34	**0.84**	20.0	284	0.57	1.24
Rock	9	9.5	0.01	**0.14**	49.8	88	0.05	0.35
Snow	11	12.2	0.23	**0.65**	44.4	52	0.28	1.52

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 42. Habitat-specific density estimates of Ruby-crowned Kinglet at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	0							
Low Elevation Meadow	0							
Conifer Deciduous Mix	0							
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	0							
East-side Western Hemlock	0							
Douglas-fir	0							
High-elevation Shrub	1	6.7	0.09	**0.15**	101.6	14	0.02	0.91
Pacific Silver Fir	1	1.2	0.00	**0.03**	101.6	83	<0.01	0.14
Mountain Hemlock	2	2.8	0.00	**0.02**	71.8	70	<0.01	0.06
Lodgepole Pine	0							
Subalpine Fir	7	5.2	0.05	**0.03**	39.8	132	0.01	0.07
Meadow/Heather	11	4.9	0.01	**0.03**	39.2	202	0.01	0.06
Rock	3	3.6	0.00	**0.01**	71.8	83	<0.01	0.05
Snow	7	12.2	0.03	**0.08**	43.4	48	0.04	0.19

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 43. Habitat-specific density estimates of Townsend's Solitaire at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	0							
Low Elevation Meadow	0							
Conifer Deciduous Mix	0							
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	0							
East-side Western Hemlock	0							
Douglas-fir	0							
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	2	2.8	0.00	**<0.01**	81.3	70	<0.01	0.02
Lodgepole Pine	0							
Subalpine Fir	5	3.7	0.02	**0.01**	60.2	132	<0.01	0.02
Meadow/Heather	17	6.4	0.03	**0.01**	50.7	202	<0.01	0.03
Rock	7	8.3	0.01	**0.01**	57.0	83	<0.01	0.03
Snow	3	6.1	0.03	**0.01**	69.8	48	<0.01	0.04

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 44. Habitat-specific density estimates of Swainson's Thrush at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	31	46.2	0.39	**0.88**	27.3	102	0.52	1.49
Bigleaf Maple	5	15.8	0.07	**0.25**	60.9	21	0.08	0.80
Hardwood Mix Forest	5	21.1	0.07	**0.31**	52.1	23	0.11	0.85
Low-elevation Shrub	35	69.0	0.66	**1.22**	25.4	93	0.74	2.00
Low Elevation Meadow	8	100.0	0.76	**0.69**	41.1	4	0.23	2.06
Conifer Deciduous Mix	45	29.2	0.28	**0.45**	25.4	263	0.27	0.73
Sitka Spruce	20	23.3	0.19	**0.39**	31.7	116	0.21	0.73
Western Redcedar	2	10.0	0.00	**0.12**	74.1	22	0.03	0.44
Western Redcedar/Western Hemlock	19	14.9	0.09	**0.20**	34.0	175	0.10	0.38
West-side Western Hemlock	30	10.4	0.08	**0.15**	29.7	389	0.08	0.26
East-side Western Hemlock	9	7.1	0.03	**0.10**	53.6	105	0.04	0.26
Douglas-fir	6	3.2	0.02	**0.05**	49.8	198	0.02	0.12
High-elevation Shrub	2	6.7	0.17	**0.16**	101.5	15	0.03	0.95
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	0							
Rock	4	4.8	0.00	**0.02**	68.6	83	<0.01	0.05
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 45. Habitat-specific density estimates of Hermit Thrush at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	1	3.4	0.00	**0.01**	108.3	38	<0.01	0.07
Low Elevation Meadow	0							
Conifer Deciduous Mix	0							
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	2	2.0	0.00	**0.01**	81.8	150	<0.01	0.03
West-side Western Hemlock	2	0.9	0.00	**<0.01**	82.0	271	<0.01	0.01
East-side Western Hemlock	12	11.8	0.03	**0.05**	53.8	119	0.02	0.13
Douglas-fir	9	4.5	0.03	**0.02**	57.4	155	0.01	0.06
High-elevation Shrub	11	53.3	0.17	**0.23**	50.3	65	0.09	0.58
Pacific Silver Fir	24	23.8	0.01	**0.08**	47.7	89	0.03	0.19
Mountain Hemlock	28	28.2	0.02	**0.07**	44.1	183	0.03	0.16
Lodgepole Pine	0							
Subalpine Fir	33	21.6	0.06	**0.05**	41.9	173	0.02	0.11
Meadow/Heather	52	21.2	0.01	**0.04**	41.4	168	0.02	0.09
Rock	20	21.4	0.00	**0.04**	44.7	192	0.02	0.09
Snow	6	12.2	0.00	**0.02**	57.3	124	0.01	0.06

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 46. Habitat-specific density estimates of American Robin at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	42	69.2	0.72	**0.99**	18.2	105	0.69	1.42
Bigleaf Maple	17	57.9	0.54	**0.84**	30.5	25	0.46	1.56
Hardwood Mix Forest	22	73.7	0.67	**1.09**	22.3	34	0.70	1.71
Low-elevation Shrub	29	55.2	0.70	**0.94**	26.0	44	0.56	1.58
Low Elevation Meadow	6	60.0	0.51	**1.18**	43.8	5	0.41	3.41
Conifer Deciduous Mix	122	62.3	0.72	**0.95**	16.1	357	0.70	1.31
Sitka Spruce	46	48.3	0.45	**0.71**	20.6	124	0.47	1.06
Western Redcedar	5	20.0	0.00	**0.19**	47.4	22	0.07	0.48
Western Redcedar/Western Hemlock	38	24.8	0.21	**0.33**	25.3	159	0.20	0.53
West-side Western Hemlock	96	30.3	0.18	**0.35**	17.1	552	0.25	0.48
East-side Western Hemlock	6	7.1	0.04	**0.07**	41.3	99	0.03	0.15
Douglas-fir	42	22.6	0.11	**0.19**	22.8	270	0.12	0.29
High-elevation Shrub	1	6.7	0.09	**0.06**	100.7	14	0.01	0.38
Pacific Silver Fir	0							
Mountain Hemlock	5	7.0	0.05	**0.06**	51.4	84	0.02	0.15
Lodgepole Pine	0							
Subalpine Fir	14	8.2	0.09	**0.10**	37.8	176	0.05	0.20
Meadow/Heather	15	6.9	0.03	**0.06**	31.2	257	0.03	0.11
Rock	19	15.5	0.15	**0.20**	33.8	122	0.10	0.38
Snow	5	8.2	0.08	**0.10**	53.8	57	0.04	0.28

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 47. Habitat-specific density estimates of Varied Thrush at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	5	12.8	0.03	**0.03**	43.8	44	0.01	0.06
Bigleaf Maple	4	15.8	0.07	**0.05**	59.4	19	0.01	0.14
Hardwood Mix Forest	4	21.1	0.00	**0.05**	47.1	20	0.02	0.12
Low-elevation Shrub	6	20.7	0.00	**0.04**	43.0	32	0.02	0.09
Low Elevation Meadow	2	40.0	0.00	**0.07**	66.3	5	0.02	0.34
Conifer Deciduous Mix	38	29.2	0.01	**0.08**	20.7	209	0.05	0.11
Sitka Spruce	40	55.0	0.06	**0.14**	17.8	161	0.10	0.20
Western Redcedar	4	15.0	0.00	**0.02**	100.7	20	<0.01	0.12
Western Redcedar/Western Hemlock	30	26.7	0.01	**0.06**	20.9	196	0.04	0.10
West-side Western Hemlock	158	52.0	0.09	**0.14**	14.0	674	0.11	0.19
East-side Western Hemlock	37	34.1	0.09	**0.08**	22.5	149	0.05	0.12
Douglas-fir	81	37.4	0.05	**0.11**	16.9	422	0.08	0.15
High-elevation Shrub	2	13.3	0.00	**0.01**	100.7	14	<0.01	0.09
Pacific Silver Fir	92	63.1	0.17	**0.21**	16.9	251	0.15	0.29
Mountain Hemlock	56	45.1	0.14	**0.14**	30.4	256	0.08	0.25
Lodgepole Pine	0							
Subalpine Fir	38	20.9	0.06	**0.05**	31.9	316	0.03	0.10
Meadow/Heather	82	30.0	0.03	**0.06**	28.5	282	0.04	0.11
Rock	10	10.7	0.00	**0.02**	41.7	181	0.01	0.05
Snow	20	30.6	0.05	**0.06**	36.3	148	0.03	0.13

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 48. Habitat-specific density estimates of American Pipit at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	0							
Low Elevation Meadow	0							
Conifer Deciduous Mix	0							
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	0							
East-side Western Hemlock	0							
Douglas-fir	0							
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	20	6.4	0.07	**0.10**	33.6	258	0.05	0.19
Rock	31	21.4	0.27	**0.36**	29.8	135	0.20	0.64
Snow	13	18.4	0.13	**0.19**	52.1	59	0.07	0.51

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 49. Habitat-specific density estimates of Orange-crowned Warbler at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	1	5.3	0.00	**0.04**	100.3	18	0.01	0.23
Hardwood Mix Forest	2	5.3	0.00	**0.08**	100.3	18	0.01	0.46
Low-elevation Shrub	4	10.3	0.04	**0.05**	69.9	28	0.01	0.19
Low Elevation Meadow	0							
Conifer Deciduous Mix	1	0.9	0.00	**0.01**	100.3	105	<0.01	0.04
Sitka Spruce	0							
Western Redcedar	3	15.0	0.00	**0.11**	55.2	19	0.04	0.34
Western Redcedar/Western Hemlock	14	10.9	0.09	**0.10**	31.3	100	0.05	0.18
West-side Western Hemlock	1	0.5	0.00	**<0.01**	100.3	220	<0.01	0.02
East-side Western Hemlock	0							
Douglas-fir	0							
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	1	0.5	0.01	**0.00**				
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 50. Habitat-specific density estimates of Yellow Warbler at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	5	17.2	0.22	**0.43**	42.6	28	0.19	1.00
Low Elevation Meadow	0							
Conifer Deciduous Mix	3	1.9	0.01	**0.07**	74.9	105	0.02	0.27
Sitka Spruce	1	1.7	0.00	**0.00**				
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	0							
East-side Western Hemlock	2	2.4	0.03	**0.06**	71.0	84	0.02	0.21
Douglas-fir	1	0.6	0.01	**0.02**	100.5	154	<0.01	0.08
High-elevation Shrub	1	6.7	0.09	**0.17**	100.5	14	0.03	1.00
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	1	0.7	0.01	**0.02**	101.1	132	<0.01	0.11
Meadow/Heather	1	0.5	0.01	**0.01**	101.1	202	<0.01	0.07
Rock	2	1.2	0.01	**0.06**	101.1	83	0.01	0.34
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 51. Habitat-specific density estimates of Yellow-rumped Warbler at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	0							
Low Elevation Meadow	0							
Conifer Deciduous Mix	2	1.9	0.02	**0.05**	72.6	105	0.01	0.18
Sitka Spruce	0							
Western Redcedar	1	5.0	0.06	**0.13**	101.6	19	0.02	0.75
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	0							
East-side Western Hemlock	0							
Douglas-fir	2	1.3	0.00	**0.02**	101.6	154	<0.01	0.09
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	2	22.2	0.28	**0.57**	68.5	8	0.14	2.39
Subalpine Fir	16	11.2	0.07	**0.15**	30.1	132	0.08	0.27
Meadow/Heather	14	6.9	0.04	**0.09**	29.8	202	0.05	0.16
Rock	7	7.1	0.01	**0.10**	42.3	83	0.04	0.22
Snow	2	4.1	0.00	**0.00**				

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 52. Habitat-specific density estimates of Black-throated Gray Warbler at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	12	25.6	0.10	**0.18**	35.2	74	0.09	0.37
Bigleaf Maple	4	21.1	0.13	**0.14**	49.8	25	0.05	0.36
Hardwood Mix Forest	4	21.1	0.13	**0.10**	58.0	23	0.03	0.32
Low-elevation Shrub	5	13.8	0.09	**0.11**	54.3	37	0.04	0.32
Low Elevation Meadow	1	20.0	0.00	**0.20**	101.1	4	0.02	2.09
Conifer Deciduous Mix	30	17.0	0.23	**0.18**	31.1	174	0.10	0.33
Sitka Spruce	8	11.7	0.09	**0.08**	45.8	86	0.03	0.18
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	11	4.1	0.01	**0.03**	44.4	287	0.01	0.06
East-side Western Hemlock	0							
Douglas-fir	3	1.9	0.00	**<0.01**	102.0	166	<0.01	0.02
High-elevation Shrub	0							
Pacific Silver Fir	1	1.2	0.00	**0.01**	102.0	90	<0.01	0.04
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	0							
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 53. Habitat-specific density estimates of Townsend's Warbler at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	1	2.6	0.03	**0.02**	112.4	60	0.00	0.10
Bigleaf Maple	1	5.3	0.00	**0.03**	112.4	29	0.01	0.21
Hardwood Mix Forest	3	10.5	0.00	**0.10**	89.1	39	0.02	0.46
Low-elevation Shrub	1	3.4	0.00	**0.02**	112.4	44	0.00	0.13
Low Elevation Meadow	4	60.0	0.26	**1.31**	49.0	4	0.36	4.74
Conifer Deciduous Mix	20	15.1	0.16	**0.11**	57.4	266	0.04	0.32
Sitka Spruce	6	6.7	0.04	**0.06**	76.5	161	0.02	0.24
Western Redcedar	0							
Western Redcedar/Western Hemlock	4	3.0	0.01	**0.04**	76.8	243	0.01	0.14
West-side Western Hemlock	34	10.0	0.09	**0.10**	56.7	270	0.03	0.27
East-side Western Hemlock	21	4.7	0.15	**0.13**	56.6	253	0.05	0.37
Douglas-fir	109	38.1	0.34	**0.38**	52.8	211	0.14	1.02
High-elevation Shrub	0							
Pacific Silver Fir	2	2.4	0.03	**0.01**	87.0	173	0.00	0.06
Mountain Hemlock	0							
Lodgepole Pine	5	33.3	0.28	**0.21**	71.6	32	0.06	0.77
Subalpine Fir	0							
Meadow/Heather	2	1.0	0.01	**0.02**	72.0	202	0.00	0.06
Rock	2	1.2	0.01	**0.02**	101.1	83	0.00	0.10
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 54. Habitat-specific density estimates of MacGillivray's Warbler at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	2	10.5	0.07	**0.04**	100.6	18	0.01	0.28
Hardwood Mix Forest	0							
Low-elevation Shrub	1	3.4	0.00	**0.03**	100.6	28	0.01	0.17
Low Elevation Meadow	0							
Conifer Deciduous Mix	3	2.8	0.02	**0.03**	58.2	105	0.01	0.07
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	0							
East-side Western Hemlock	0							
Douglas-fir	4	2.6	0.01	**0.02**	50.7	154	0.01	0.06
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	0							
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 55. Habitat-specific density estimates of Common Yellowthroat at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	1	5.3	0.00	**0.00**				
Low-elevation Shrub	8	20.7	0.35	**0.56**	41.3	28	0.25	1.27
Low Elevation Meadow	1	20.0	0.00	**0.38**	100.4	4	0.04	3.88
Conifer Deciduous Mix	1	0.9	0.00	**0.02**	100.6	105	<0.01	0.10
Sitka Spruce	0							
Western Redcedar	1	5.0	0.00	**0.10**	100.6	19	0.02	0.59
Western Redcedar/Western Hemlock	1	1.0	0.01	**0.02**	100.6	100	0.00	0.11
West-side Western Hemlock	0							
East-side Western Hemlock	0							
Douglas-fir	0							
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	0							
Rock	1	1.2	0.00	**0.02**	100.4	83	<0.01	0.12
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 56. Habitat-specific density estimates of Wilson's Warbler at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	19	33.3	0.46	**0.54**	32.5	48	0.28	1.01
Bigleaf Maple	5	26.3	0.20	**0.34**	40.9	21	0.15	0.78
Hardwood Mix Forest	3	10.5	0.13	**0.14**	100.6	18	0.02	0.79
Low-elevation Shrub	9	24.1	0.35	**0.41**	37.7	33	0.19	0.85
Low Elevation Meadow	1	20.0	0.00	**0.00**				
Conifer Deciduous Mix	30	23.6	0.24	**0.36**	22.2	169	0.23	0.55
Sitka Spruce	13	16.7	0.15	**0.22**	37.1	70	0.11	0.45
Western Redcedar	2	10.0	0.13	**0.13**	69.7	20	0.04	0.49
Western Redcedar/Western Hemlock	18	14.9	0.15	**0.21**	31.1	128	0.11	0.38
West-side Western Hemlock	37	12.2	0.12	**0.20**	24.4	312	0.13	0.32
East-side Western Hemlock	2	2.4	0.00	**0.03**	71.1	88	0.01	0.11
Douglas-fir	4	2.6	0.01	**0.03**	58.4	165	0.01	0.07
High-elevation Shrub	3	13.3	0.26	**0.26**	73.2	15	0.06	1.06
Pacific Silver Fir	2	2.4	0.03	**0.03**	71.1	87	0.01	0.11
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	1	0.5	0.01	**0.01**	101.1	202	<0.01	0.07
Rock	2	2.4	0.00	**0.07**	71.8	83	0.02	0.24
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 57. Habitat-specific density estimates of Western Tanager at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	4	10.3	0.03	**0.05**	58.1	43	0.02	0.16
Bigleaf Maple	6	31.6	0.13	**0.19**	42.1	23	0.08	0.43
Hardwood Mix Forest	3	10.5	0.20	**0.11**	74.4	20	0.03	0.45
Low-elevation Shrub	3	10.3	0.13	**0.07**	57.6	32	0.02	0.22
Low Elevation Meadow	0							
Conifer Deciduous Mix	24	19.8	0.12	**0.14**	25.5	168	0.09	0.23
Sitka Spruce	4	6.7	0.02	**0.05**	50.9	70	0.02	0.12
Western Redcedar	0							
Western Redcedar/Western Hemlock	2	1.0	0.00	**0.01**	101.1	104	<0.01	0.07
West-side Western Hemlock	12	5.0	0.02	**0.04**	33.0	283	0.02	0.07
East-side Western Hemlock	2	2.4	0.01	**0.02**	71.8	91	<0.01	0.06
Douglas-fir	11	6.5	0.03	**0.05**	34.1	207	0.02	0.09
High-elevation Shrub	0							
Pacific Silver Fir	1	1.2	0.00	**0.01**	101.1	87	<0.01	0.04
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	0							
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 58. Habitat-specific density estimates of Song Sparrow at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	15	33.3	0.29	**0.34**	29.6	60	0.19	0.60
Bigleaf Maple	6	26.3	0.20	**0.20**	60.0	20	0.06	0.63
Hardwood Mix Forest	1	5.3	0.07	**0.05**	101.0	19	0.01	0.29
Low-elevation Shrub	8	20.7	0.31	**0.26**	42.2	35	0.11	0.59
Low Elevation Meadow	3	60.0	0.00	**1.10**	66.4	4	0.21	5.88
Conifer Deciduous Mix	21	16.0	0.12	**0.16**	28.0	155	0.09	0.27
Sitka Spruce	4	5.0	0.04	**0.05**	75.3	63	0.01	0.18
Western Redcedar	0							
Western Redcedar/Western Hemlock	1	1.0	0.00	**0.01**	101.0	104	<0.01	0.05
West-side Western Hemlock	6	2.3	0.01	**0.03**	48.8	253	0.01	0.06
East-side Western Hemlock	1	1.2	0.00	**0.01**	101.0	87	<0.01	0.06
Douglas-fir	2	1.3	0.01	**0.01**	71.9	166	<0.01	0.04
High-elevation Shrub	1	6.7	0.09	**0.06**	101.0	15	0.01	0.38
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	2	1.5	0.00	**0.04**	74.9	132	0.01	0.15
Meadow/Heather	5	2.0	0.03	**0.07**	58.5	202	0.02	0.20
Rock	3	2.4	0.00	**0.10**	78.5	83	0.02	0.39
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 59. Habitat-specific density estimates of White-crowned Sparrow at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	2	2.6	0.00	**0.04**	101.0	38	0.01	0.23
Bigleaf Maple	1	5.3	0.00	**0.04**	101.0	18	0.01	0.26
Hardwood Mix Forest	3	10.5	0.00	**0.13**	74.2	18	0.03	0.53
Low-elevation Shrub	3	6.9	0.13	**0.09**	74.8	28	0.02	0.34
Low Elevation Meadow	0							
Conifer Deciduous Mix	6	3.8	0.00	**0.04**	67.4	105	0.01	0.13
Sitka Spruce	2	1.7	0.00	**0.01**	101.0	59	<0.01	0.07
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	0							
East-side Western Hemlock	0							
Douglas-fir	4	1.9	0.02	**0.02**	62.5	154	0.01	0.07
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	0							
Rock	5	3.6	0.03	**0.21**	82.8	83	0.05	0.88
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 60. Habitat-specific density estimates of Dark-eyed Junco at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	17	28.2	0.33	**0.41**	33.5	42	0.21	0.79
Bigleaf Maple	14	42.1	0.54	**0.78**	31.8	20	0.41	1.50
Hardwood Mix Forest	11	47.4	0.40	**0.62**	28.5	21	0.34	1.10
Low-elevation Shrub	3	10.3	0.04	**0.07**	69.9	29	0.02	0.27
Low Elevation Meadow	4	60.0	0.51	**0.80**	41.8	4	0.27	2.34
Conifer Deciduous Mix	32	22.6	0.26	**0.31**	21.9	136	0.20	0.48
Sitka Spruce	15	23.3	0.19	**0.25**	26.9	70	0.15	0.42
Western Redcedar	3	5.0	0.06	**0.05**	100.3	19	0.01	0.30
Western Redcedar/Western Hemlock	4	4.0	0.00	**0.02**	70.8	102	0.01	0.07
West-side Western Hemlock	33	10.9	0.06	**0.13**	23.5	274	0.09	0.21
East-side Western Hemlock	27	22.4	0.26	**0.29**	28.3	98	0.17	0.50
Douglas-fir	74	33.5	0.34	**0.47**	15.9	252	0.34	0.64
High-elevation Shrub	8	33.3	0.42	**0.50**	51.3	15	0.18	1.39
Pacific Silver Fir	40	32.1	0.38	**0.47**	20.9	111	0.31	0.70
Mountain Hemlock	89	73.2	0.97	**1.56**	14.2	185	1.18	2.06
Lodgepole Pine	10	55.6	1.13	**1.18**	44.3	9	0.45	3.10
Subalpine Fir	132	60.4	0.84	**1.23**	13.0	401	0.96	1.59
Meadow/Heather	237	67.5	0.70	**1.43**	11.6	665	1.14	1.80
Rock	62	54.8	0.35	**0.81**	15.7	179	0.60	1.10
Snow	34	46.9	0.34	**0.71**	23.8	65	0.44	1.13

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 61. Habitat-specific density estimates of Black-headed Grosbeak at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	3	15.8	0.13	**0.22**	55.7	18	0.07	0.66
Hardwood Mix Forest	1	5.3	0.00	**0.07**	100.7	18	0.01	0.43
Low-elevation Shrub	0							
Low Elevation Meadow	0							
Conifer Deciduous Mix	4	3.8	0.01	**0.04**	58.4	105	0.01	0.12
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	1	1.0	0.00	**0.01**	100.7	100	<0.01	0.07
West-side Western Hemlock	1	0.5	0.01	**0.01**	100.7	220	<0.01	0.03
East-side Western Hemlock	2	2.4	0.00	**0.02**	100.7	84	<0.01	0.09
Douglas-fir	4	1.9	0.02	**0.04**	62.0	154	0.01	0.11
High-elevation Shrub	0							
Pacific Silver Fir	0							
Mountain Hemlock	0							
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	0							
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 62. Habitat-specific density estimates of Pine Grosbeak at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	0							
Hardwood Mix Forest	0							
Low-elevation Shrub	0							
Low Elevation Meadow	0							
Conifer Deciduous Mix	0							
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	0							
East-side Western Hemlock	0							
Douglas-fir	0							
High-elevation Shrub	0							
Pacific Silver Fir	1	1.2	0.01	**0.03**	100.3	83	0.01	0.18
Mountain Hemlock	3	4.2	0.02	**0.04**	57.6	70	0.01	0.11
Lodgepole Pine	0							
Subalpine Fir	0							
Meadow/Heather	14	5.9	0.01	**0.05**	33.9	202	0.03	0.10
Rock	0							
Snow	0							

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 63. Habitat-specific density estimates of Red Crossbill at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	6	5.1	0.16	**0.08**	86.2	41	0.02	0.38
Bigleaf Maple	1	5.3	0.00	**0.03**	101.4	19	<0.01	0.17
Hardwood Mix Forest	0							
Low-elevation Shrub	1	3.4	0.00	**0.02**	101.4	30	<0.01	0.11
Low Elevation Meadow	0							
Conifer Deciduous Mix	31	3.8	0.26	**0.16**	72.6	117	0.04	0.58
Sitka Spruce	18	5.0	0.04	**0.17**	76.3	65	0.04	0.64
Western Redcedar	0							
Western Redcedar/Western Hemlock	7	9.9	0.06	**0.04**	40.3	144	0.02	0.08
West-side Western Hemlock	91	12.7	0.14	**0.19**	31.7	363	0.10	0.35
East-side Western Hemlock	17	10.6	0.10	**0.11**	40.0	122	0.05	0.24
Douglas-fir	33	8.4	0.14	**0.09**	37.6	300	0.05	0.19
High-elevation Shrub	0							
Pacific Silver Fir	11	10.7	0.09	**0.06**	42.3	116	0.03	0.13
Mountain Hemlock	13	15.5	0.14	**0.17**	37.8	91	0.08	0.35
Lodgepole Pine	4	11.1	0.00	**0.25**	101.4	9	0.04	1.67
Subalpine Fir	21	9.0	0.15	**0.13**	48.2	155	0.05	0.33
Meadow/Heather	46	14.8	0.13	**0.17**	25.1	286	0.11	0.28
Rock	7	6.0	0.04	**0.07**	58.7	93	0.02	0.19
Snow	11	20.4	0.10	**0.17**	37.0	64	0.08	0.35

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 64. Habitat-specific density estimates of Pine Siskin at Olympic National Park.

Habitat	No. of Detections[1]	Percent of Points with Detections[2]	Unadjusted Density (birds/ha) [3]	Adjusted Density[4]				
				Estimate (birds/ha)	CV	df	Lower 95% C.I.	Upper 95% C.I.
Red Alder	0							
Bigleaf Maple	2	10.5	0.13	**0.19**	89.4	47	0.04	0.89
Hardwood Mix Forest	0							
Low-elevation Shrub	1	6.9	0.00	**0.00**				
Low Elevation Meadow	0							
Conifer Deciduous Mix	7	5.7	0.06	**0.12**	70.9	158	0.03	0.42
Sitka Spruce	0							
Western Redcedar	0							
Western Redcedar/Western Hemlock	0							
West-side Western Hemlock	7	1.8	0.02	**0.06**	76.7	215	0.01	0.22
East-side Western Hemlock	4	2.4	0.04	**0.09**	97.3	152	0.02	0.43
Douglas-fir	10	3.2	0.04	**0.08**	76.6	198	0.02	0.31
High-elevation Shrub	0							
Pacific Silver Fir	37	21.4	0.48	**0.71**	66.0	132	0.22	2.34
Mountain Hemlock	55	39.4	0.59	**1.10**	25.2	221	0.68	1.80
Lodgepole Pine	25	55.6	3.40	**4.83**	96.1	19	0.89	26.30
Subalpine Fir	168	32.8	1.38	**1.81**	35.6	218	0.92	3.58
Meadow/Heather	330	40.4	0.80	**2.10**	32.4	369	1.13	3.90
Rock	180	29.8	0.82	**2.87**	63.3	96	0.91	9.08
Snow	43	22.4	0.81	**1.07**	72.1	54	0.29	3.90

[1]Number of individual detections during point counts, excluding flyovers.
[2]Percent of points where the species was detected, including flyovers.
[3]Based on number of detections within 50 m of the observer, with no adjustment for detectability.
[4]Estimates and statistics calculated using the software Distance 4.0 Release 2 (Buckland et al. 2003). See Methods for details.

Table 65. Estimates of total bird density (all species pooled) for each major habitat in which we completed at least ten point counts (excludes Low Elevation Meadow, Lodgepole Pine, Recent Fire Area, and Alaska Yellowcedar).

Habitat	No. of Point Counts Completed	Density of All Species Pooled (Birds/ha)
Sitka Spruce	60	9.44
Conifer Deciduous Mix	106	8.53
Red Alder	39	8.30
West-side Western Hemlock	221	6.95
Low-elevation Shrub	29	6.83
Subalpine Fir	134	6.58
Bigleaf Maple	19	6.36
Pacific Silver Fir	84	6.34
Douglas-fir	155	6.30
Hardwood Mix Forest	19	6.17
Meadow/Heather	203	6.05
Mountain Hemlock	71	6.00
Rock	84	5.66
Western Redcedar/Western Hemlock	101	5.48
East-side Western Hemlock	85	5.00
High-elevation Shrub	15	4.90
Western Redcedar	20	3.97
Snow	49	3.84

Table 66. Number of species detected in each major habitat where we completed at least ten point counts (excludes Low Elevation Meadow, Lodgepole Pine, Recent Fire Area, and Alaska Yellowcedar). Note that effort (number of points completed) was highly variable across habitats.

Habitat	No. of Point Counts Completed	No. of Species Detected During Point Counts
Conifer Deciduous Mix	106	51
Low-elevation Shrub	29	50
West-side Western Hemlock	221	45
Douglas-fir	155	44
High-elevation Shrub	15	41
Sitka Spruce	60	36
Western Redcedar/Western Hemlock	101	36
Hardwood Mix Forest	19	35
Bigleaf Maple	19	34
Rock	84	34
Meadow/Heather	203	34
East-side Western Hemlock	85	32
Red Alder	39	32
Subalpine Fir	134	31
Pacific Silver Fir	84	31
Western Redcedar	20	24
Low Elevation Meadow	5	23
Mountain Hemlock	71	23

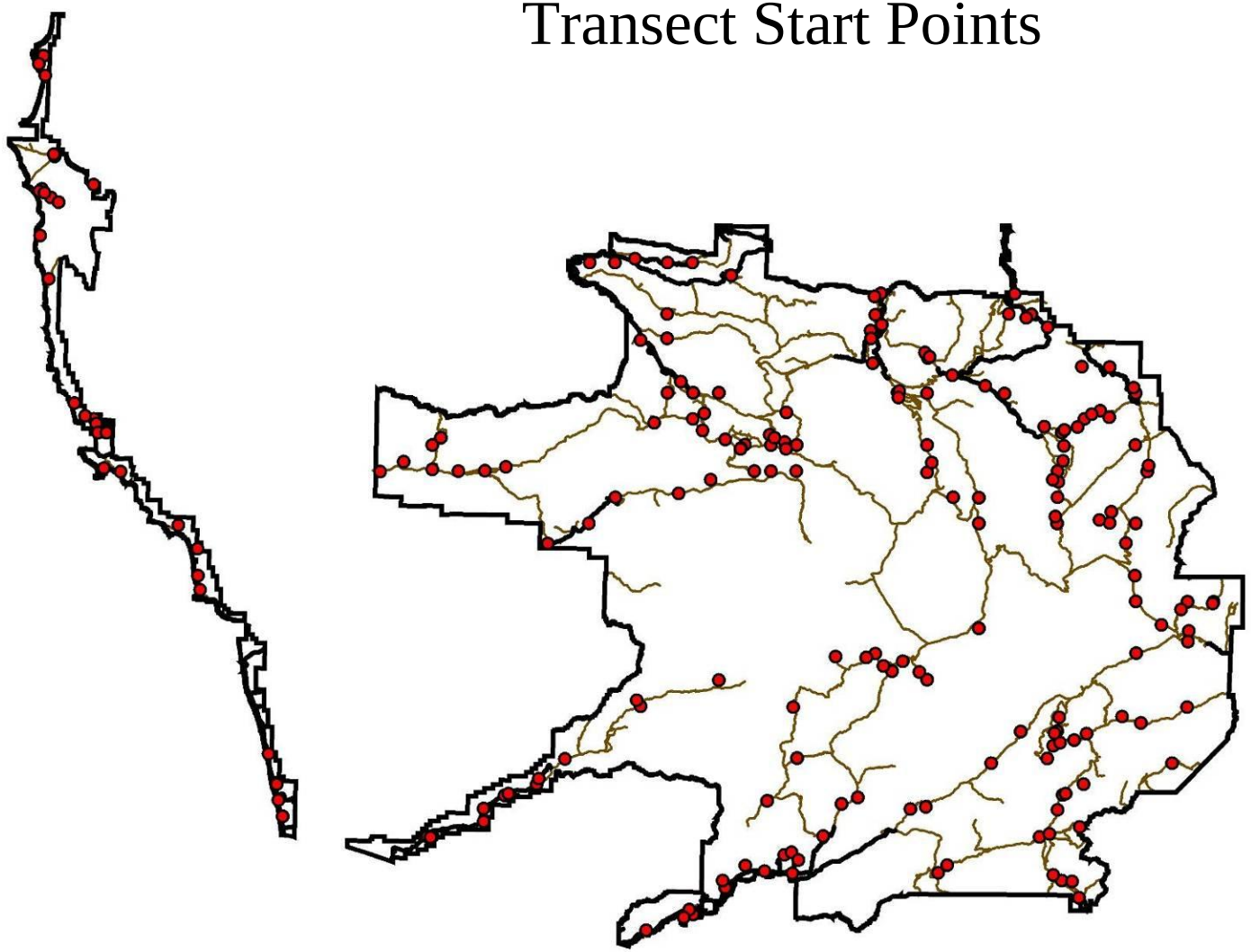

Figure 1. Location of start points for all 209 point count transects conducted at Olympic National Park. Brown lines indicate trails.

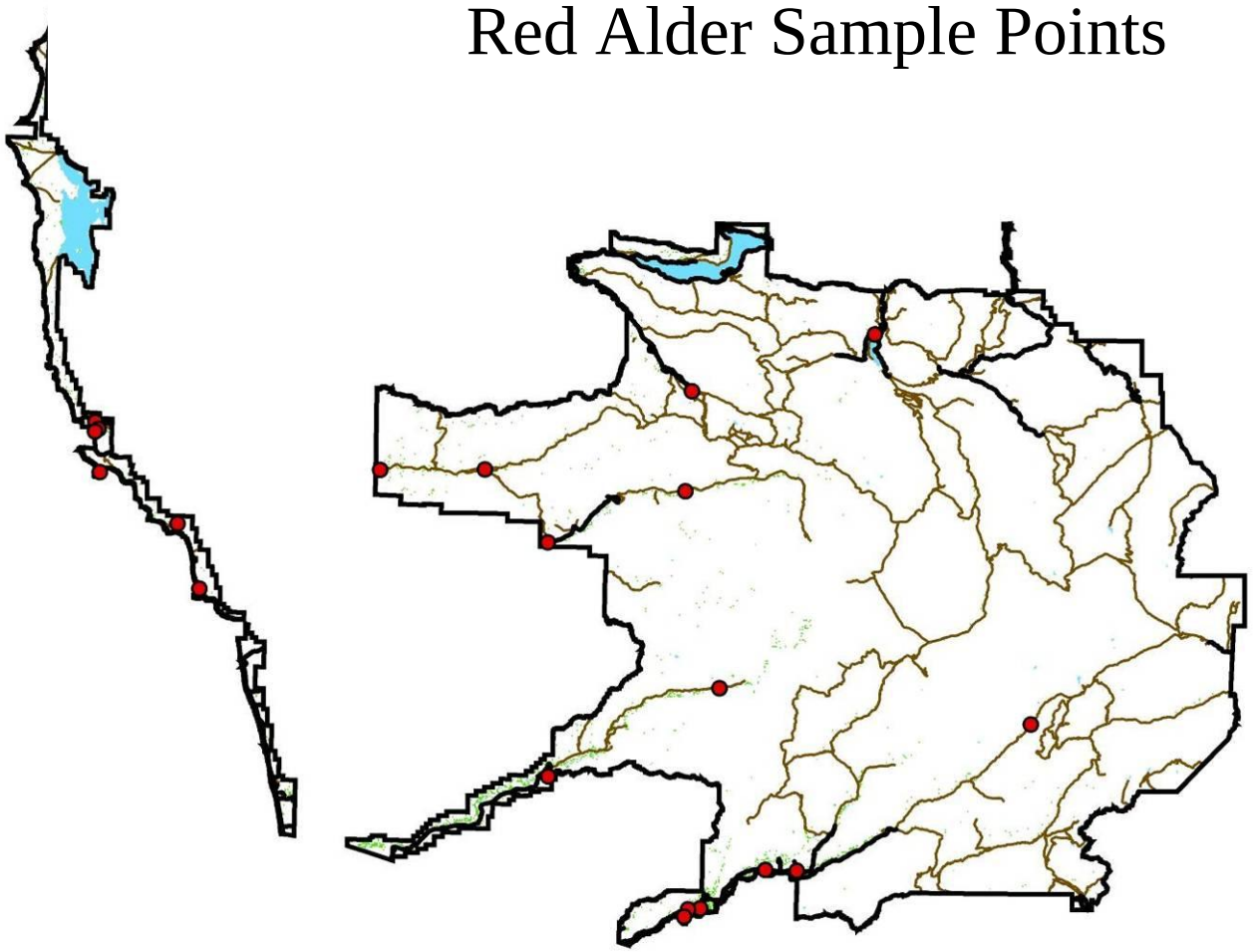

Figure 2. Green shading indicates areas mapped as Red Alder in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 20 transects that included at least one of the 39 points classified as Red Alder.

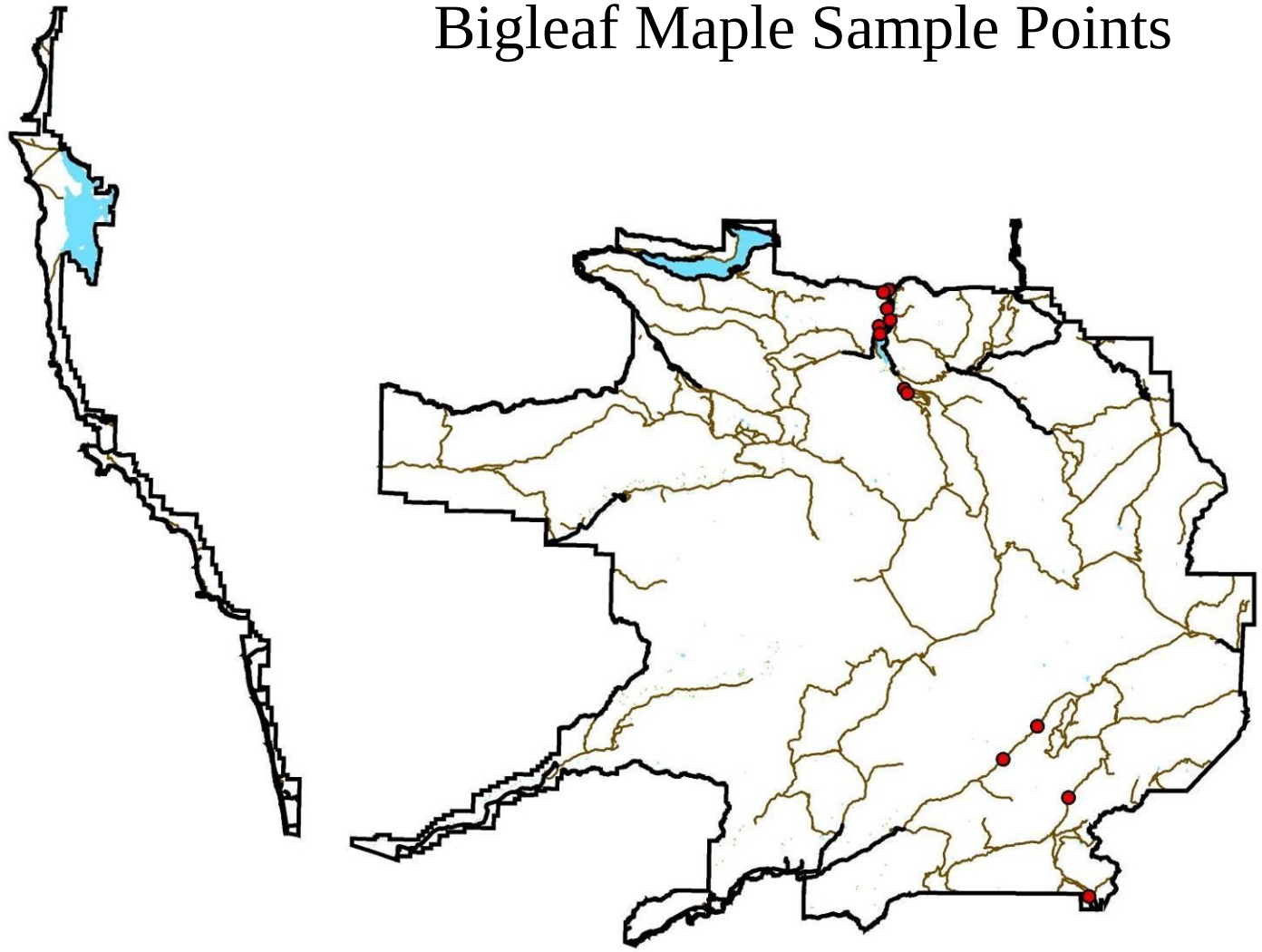

Figure 3. Green indicates areas mapped as Bigleaf Maple in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 12 transects that included at least one of the 20 points classified as Bigleaf Maple

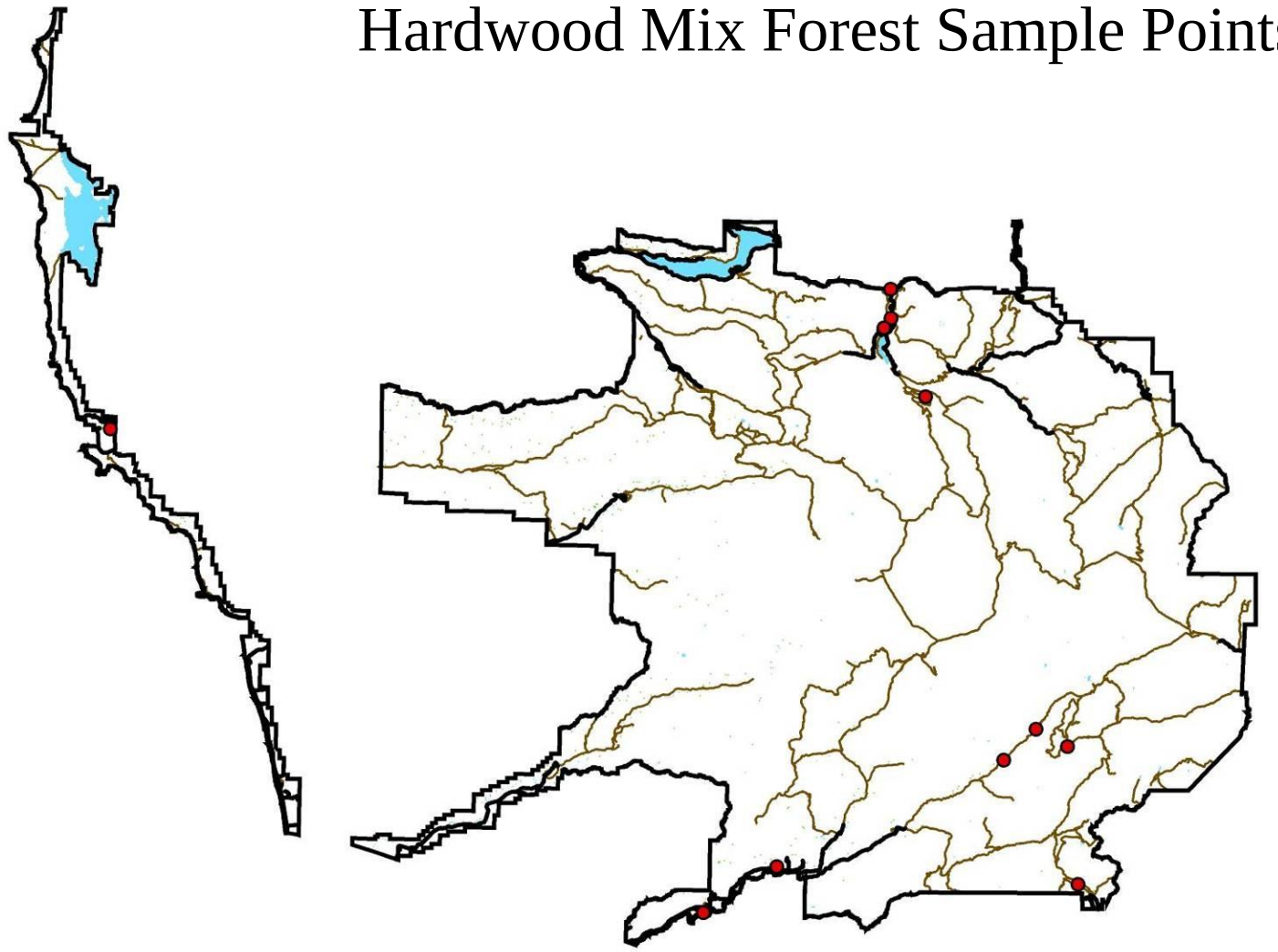

Figure 4. Green indicates areas mapped as Hardwood Mix Forest in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 11 transects that included at least one of the 19 points classified as Hardwood Mix Forest

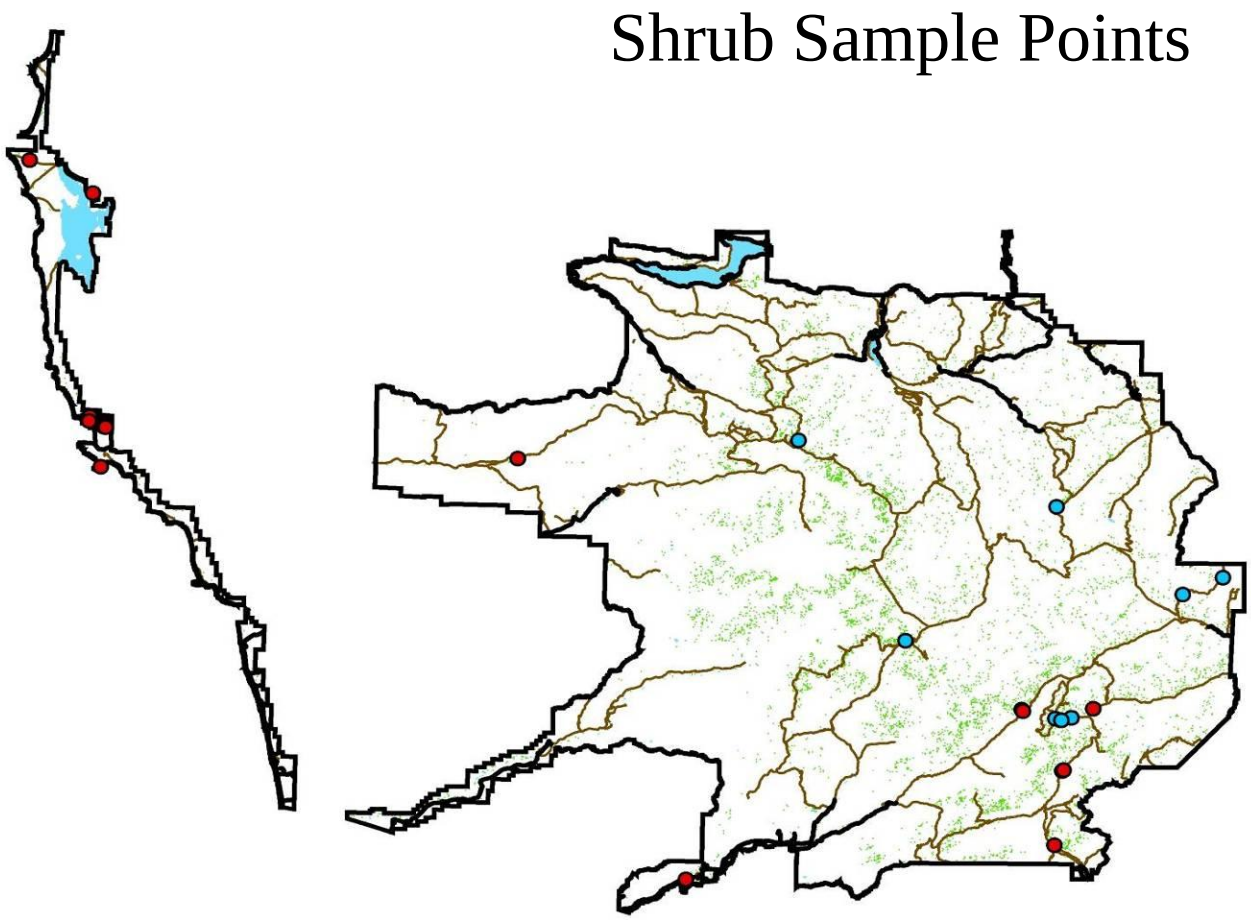

Figure 5. Green shading indicates areas mapped as Shrub in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 14 transects that included at least one of the 29 points classified as Low-elevation Shrub. Blue dots indicate the nine transects that included at least one of the 15 points classified as High-elevation Shrub. Note that a few adjacent points obscure one another in the figure.

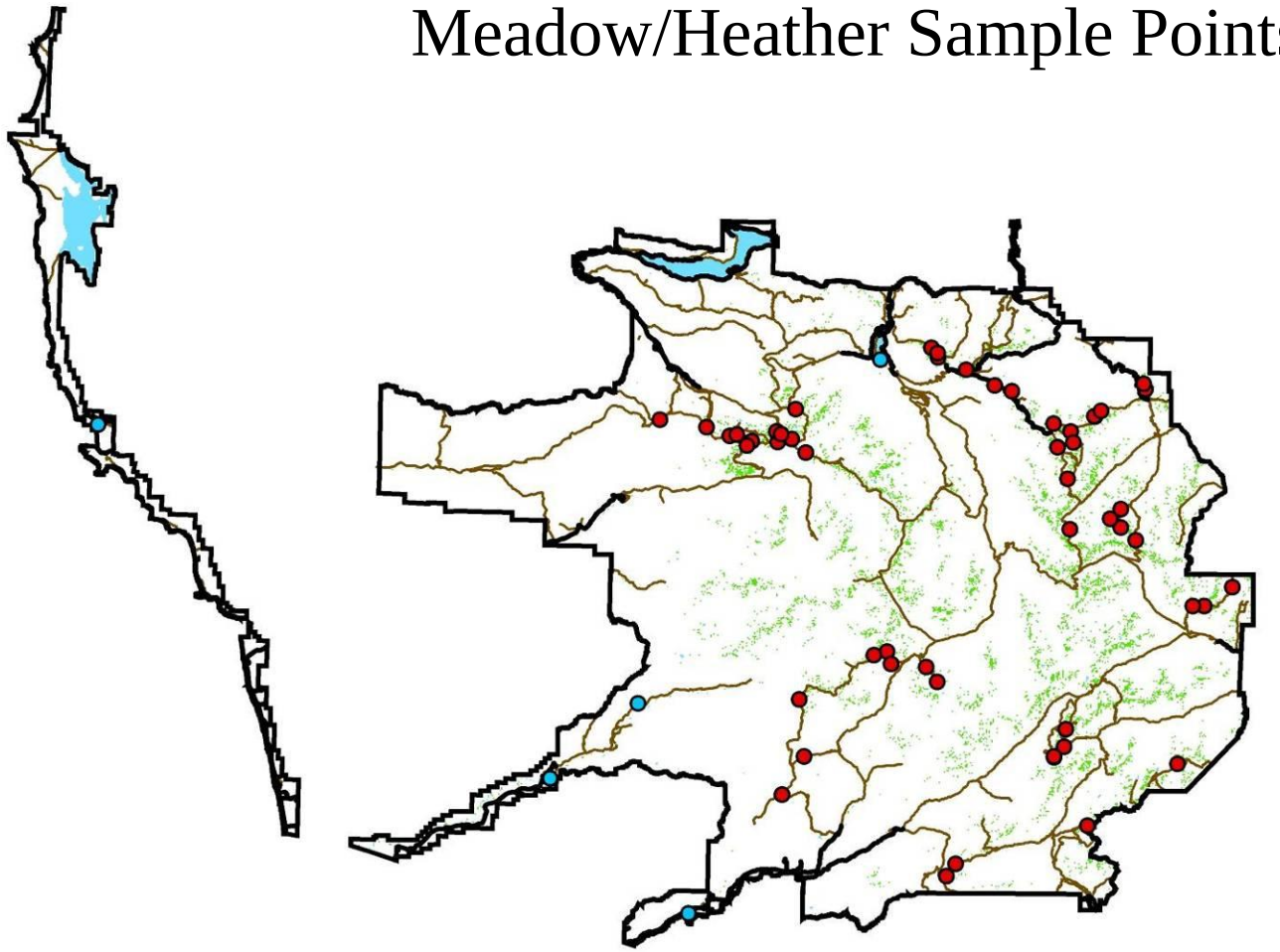

Figure 6. Green shading indicates areas mapped as Meadow or Heather in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 52 transects that included at least one of the 203 points classified as Meadow/Heather. Blue dots indicate the 5 transects that included at least one of the five points classified as Low Elevation Meadow.

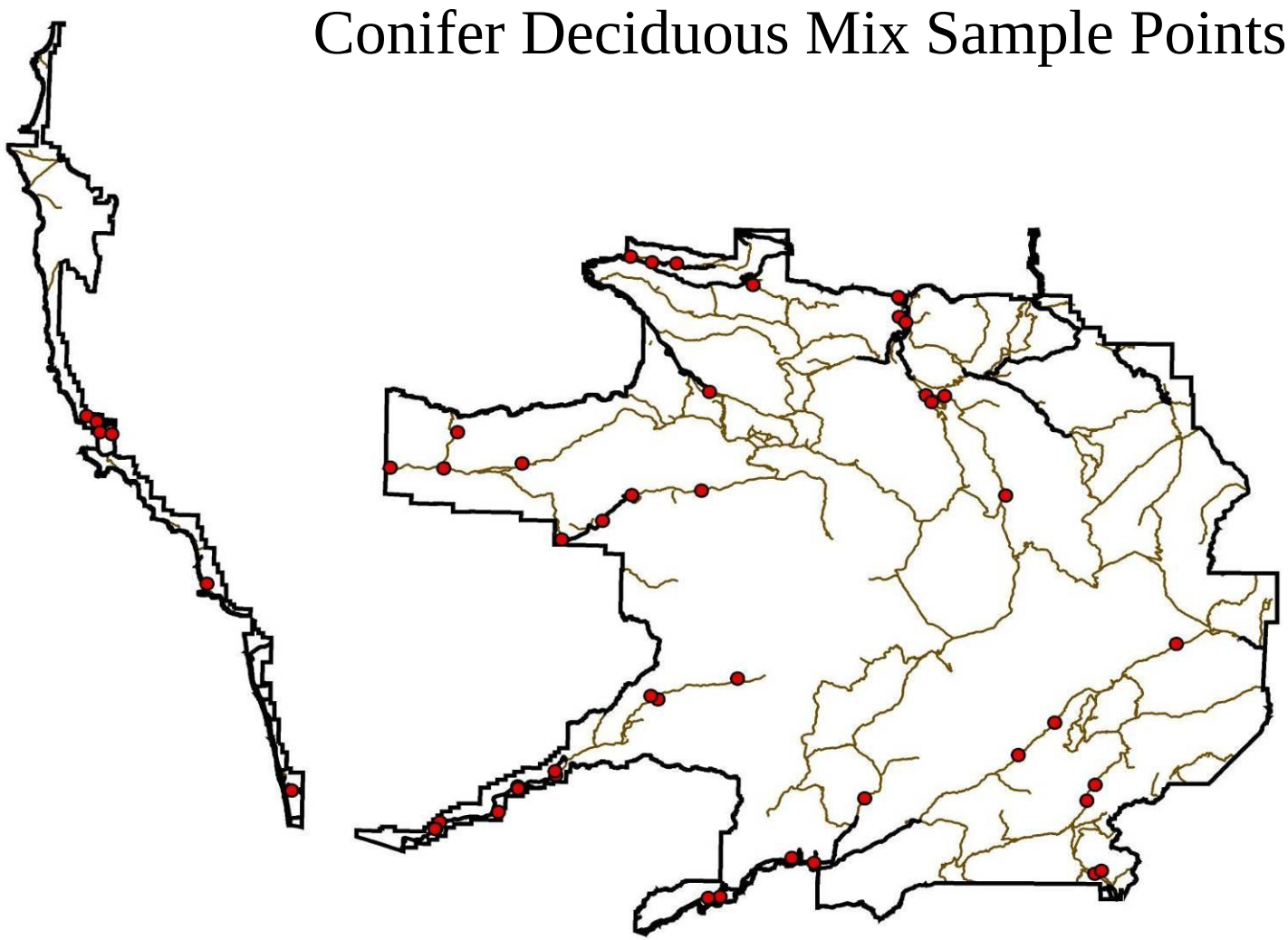

Figure 7. Red dots indicate the 51 transects that included at least one of the 106 points classified as Conifer Deciduous Mix. Pacific Meridian Resources (1996) did not use Conifer Deciduous Mix as a habitat category, so we are unable to present the map of this habitat.

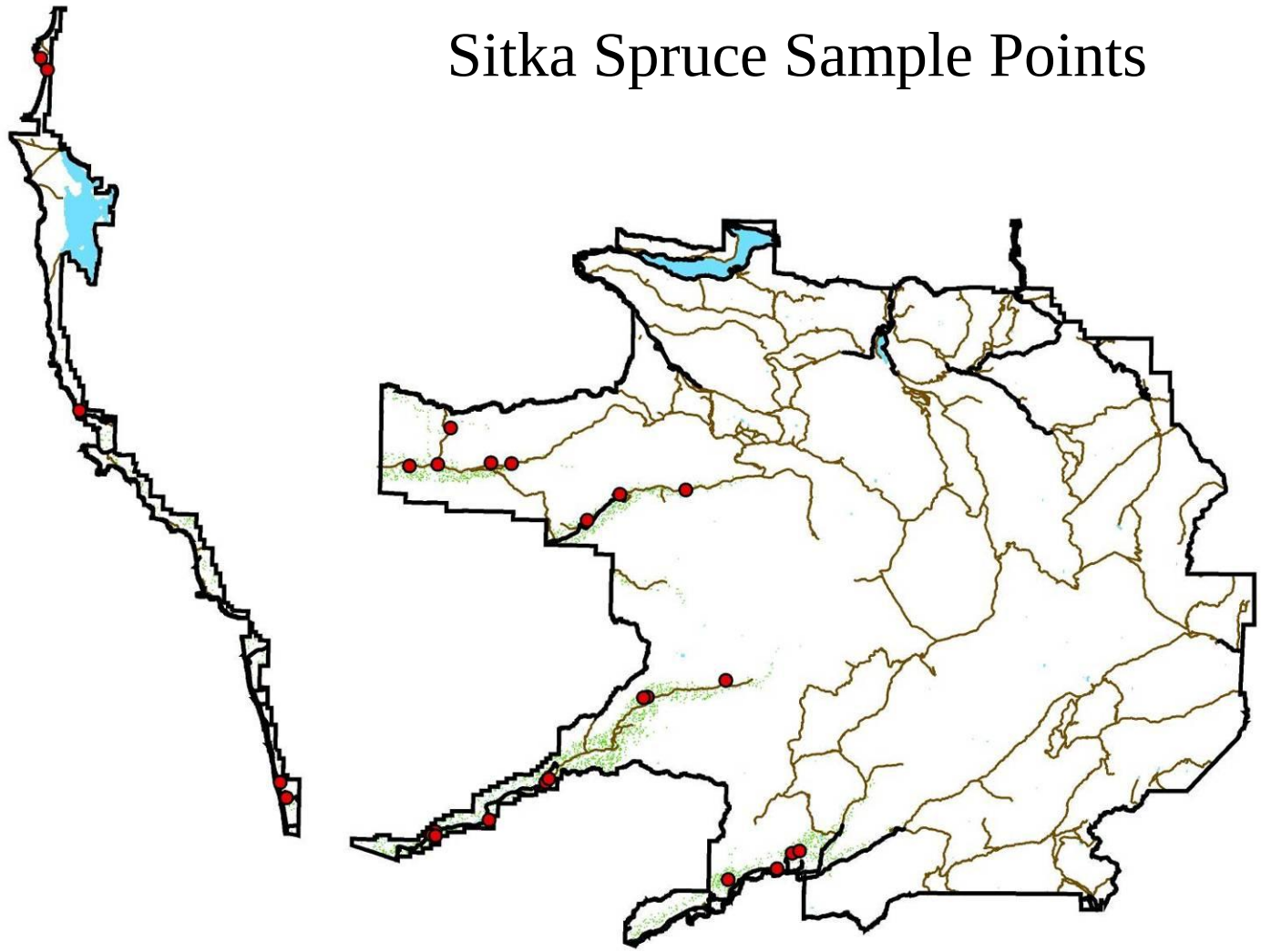

Figure 8. Green shading indicates areas mapped as Sitka Spruce in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 26 transects that included at least one of the 60 points classified as Sitka Spruce. Note that a few adjacent points obscure one another in the figure.

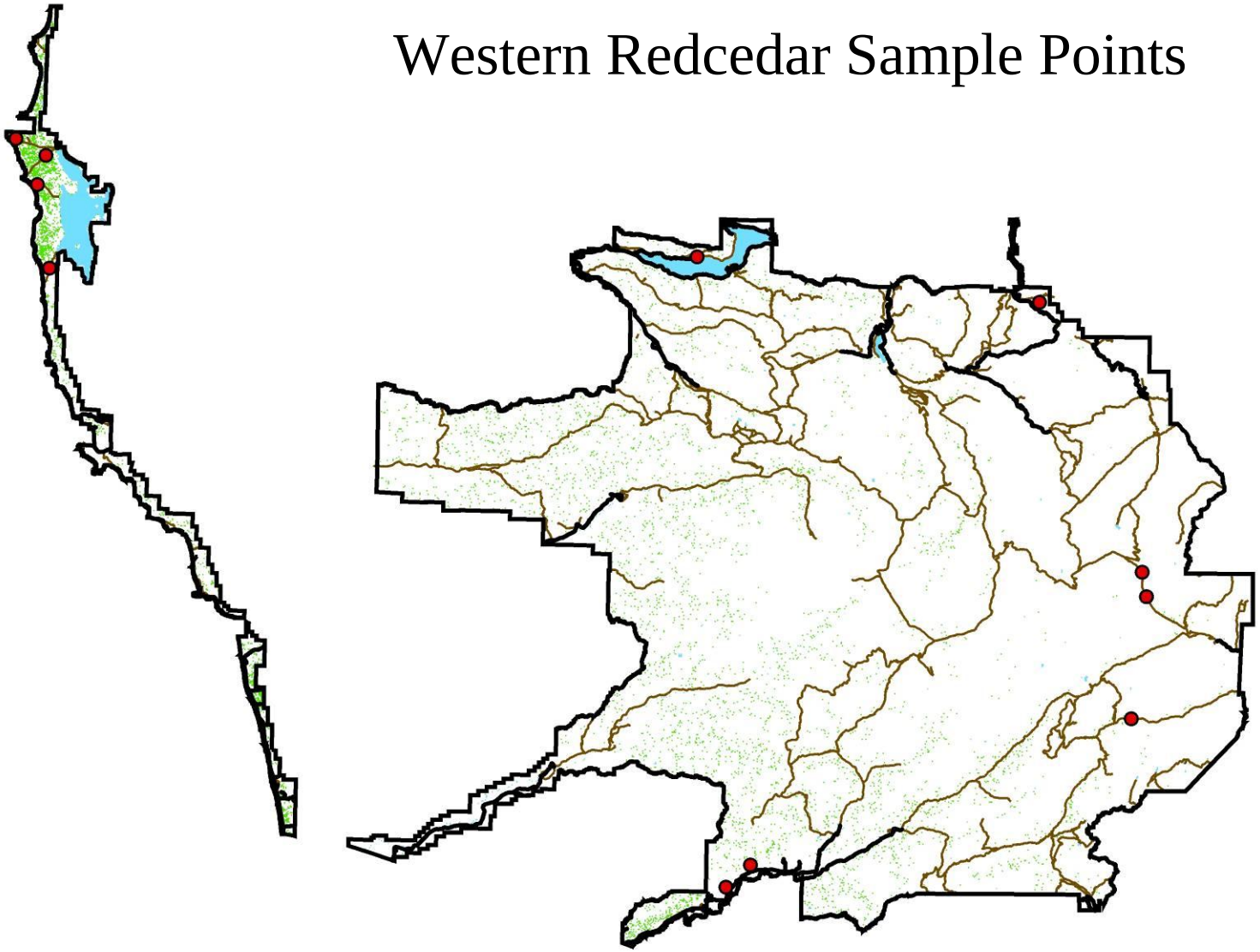

Figure 9. Green shading indicates areas mapped as Western Redcedar in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 11 transects that included at least one of the 20 points classified as Western Redcedar.

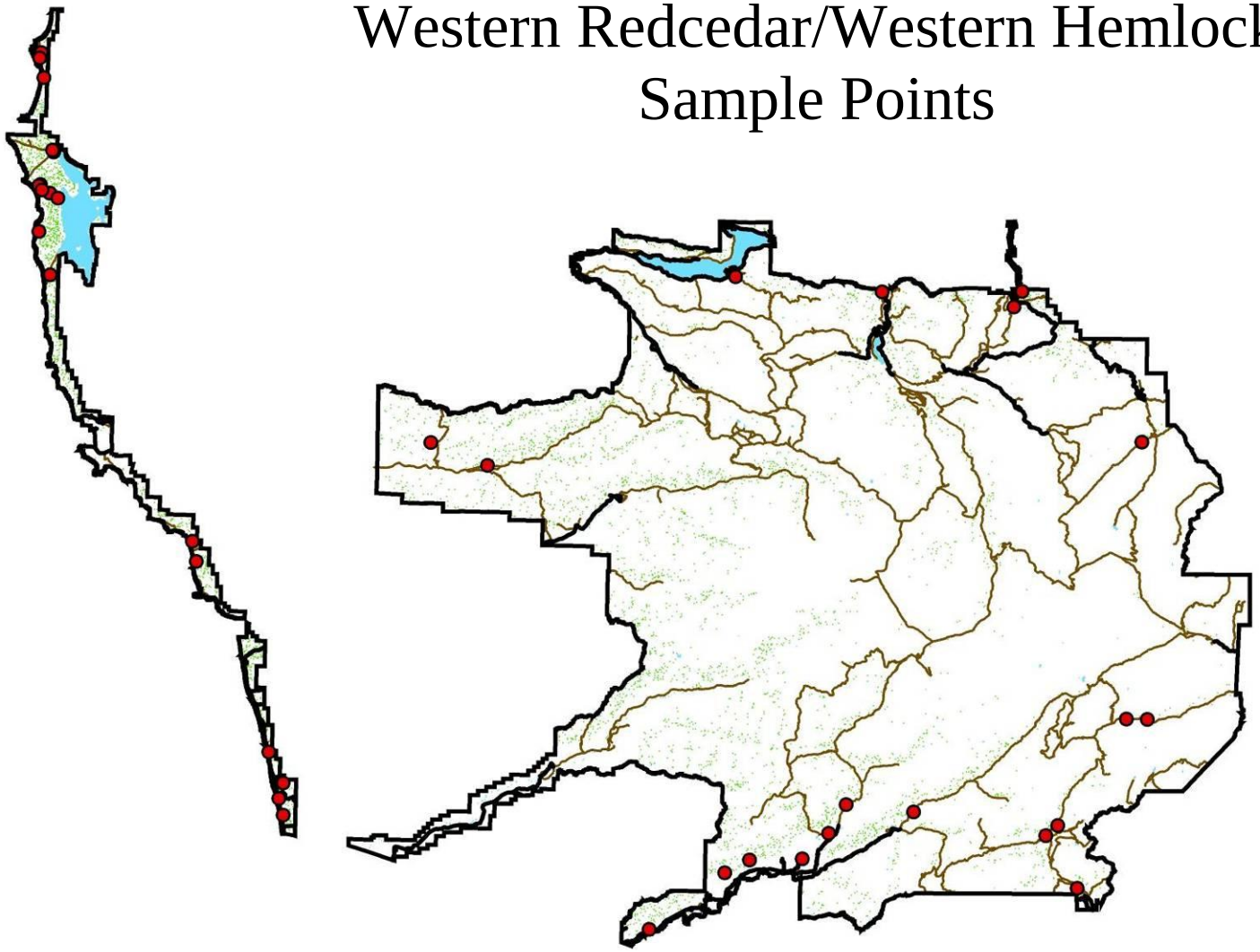

Figure 10. Green shading indicates areas mapped as Western Redcedar/Western Hemlock in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 37 transects that included at least one of the 101 points classified as Western Redcedar/Western Hemlock.

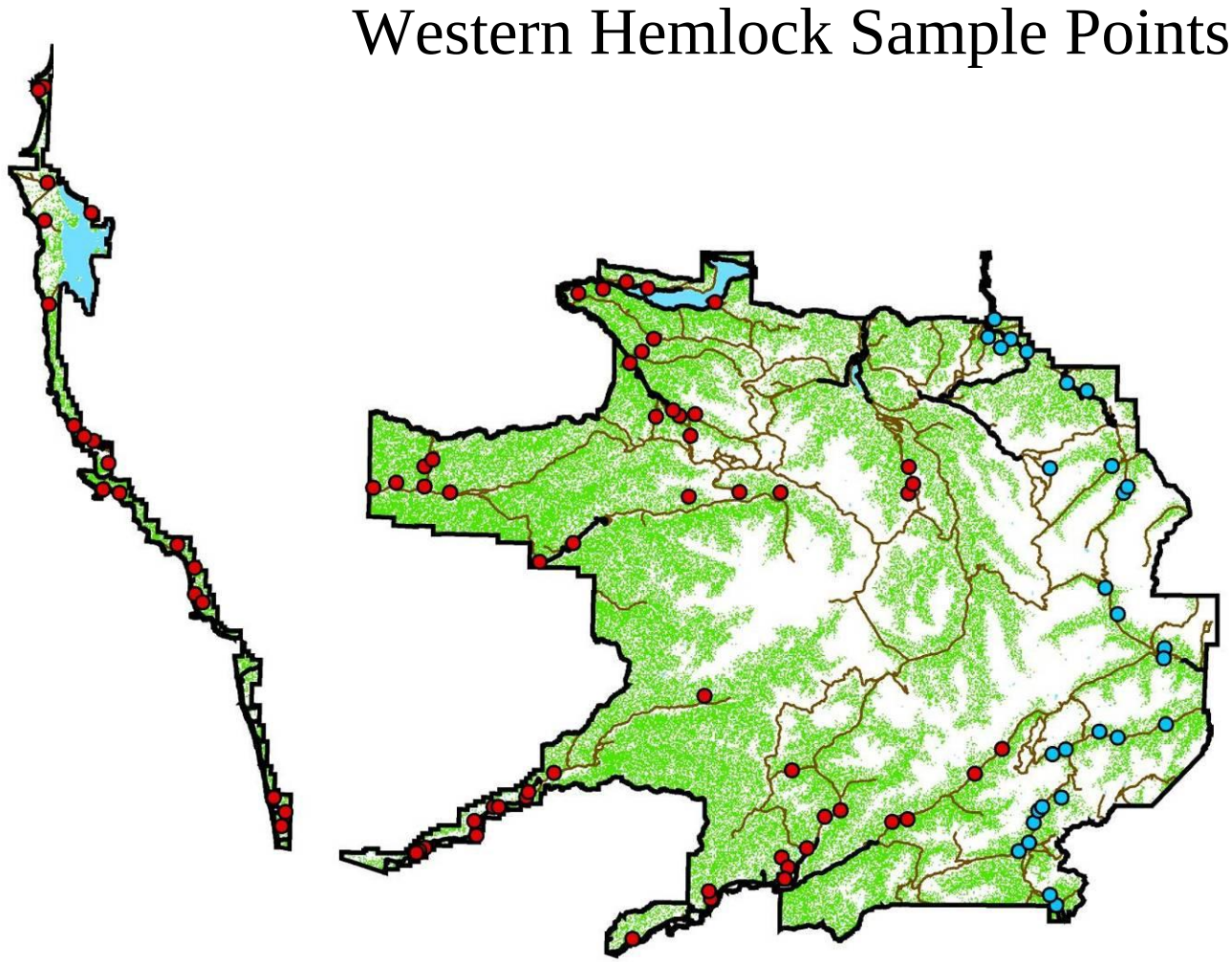

Figure 11. Green shading indicates areas mapped as Western Hemlock in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 71 transects that included at least one of the 221 points classified as West-side Western Hemlock. Blue dots indicate the 28 transects that included at least one of the 85 points classified as East-side Western Hemlock.

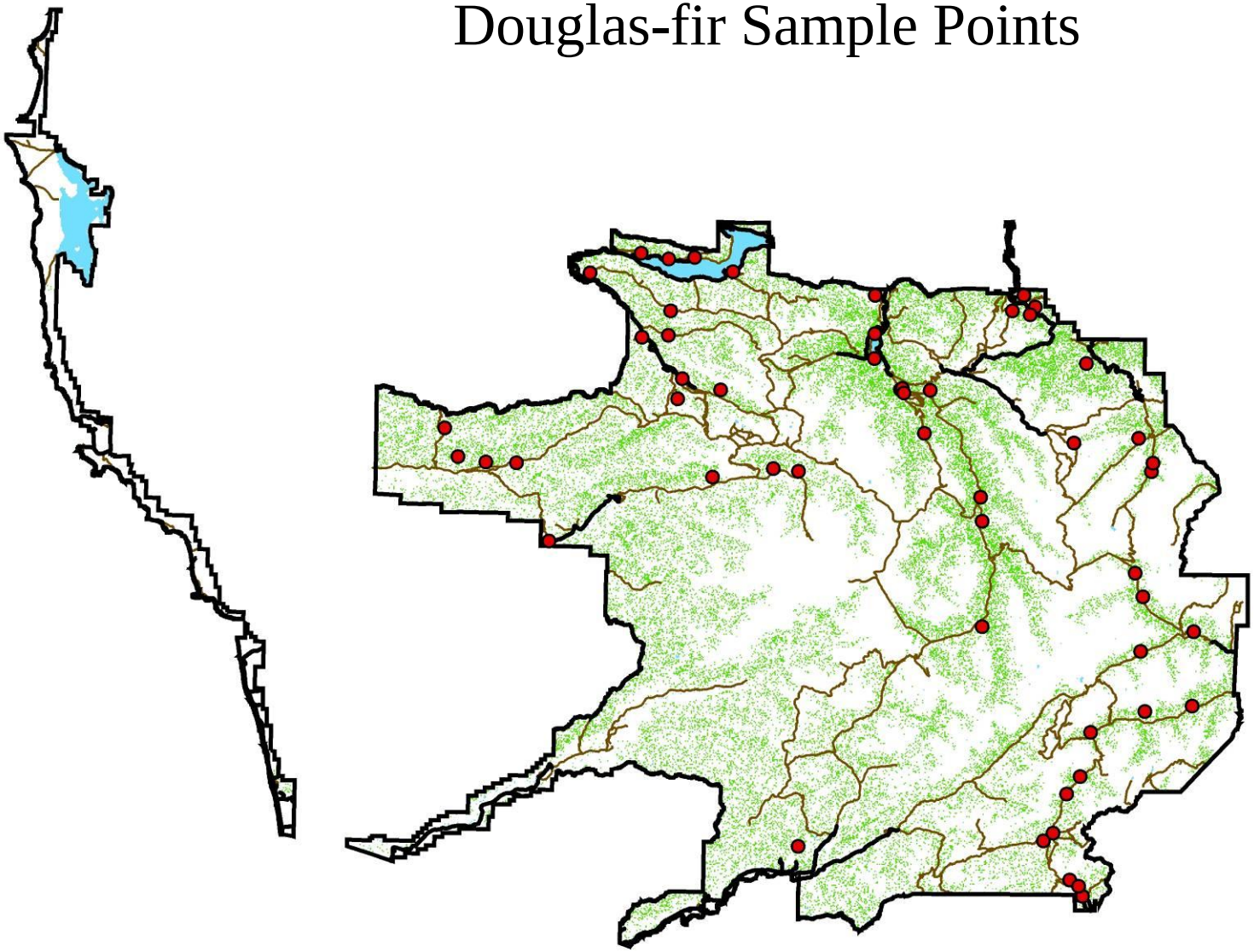

Figure 12. Green shading indicates areas mapped as Douglas-fir in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 54 transects that included at least one of the 117 points classified as Douglas-fir.

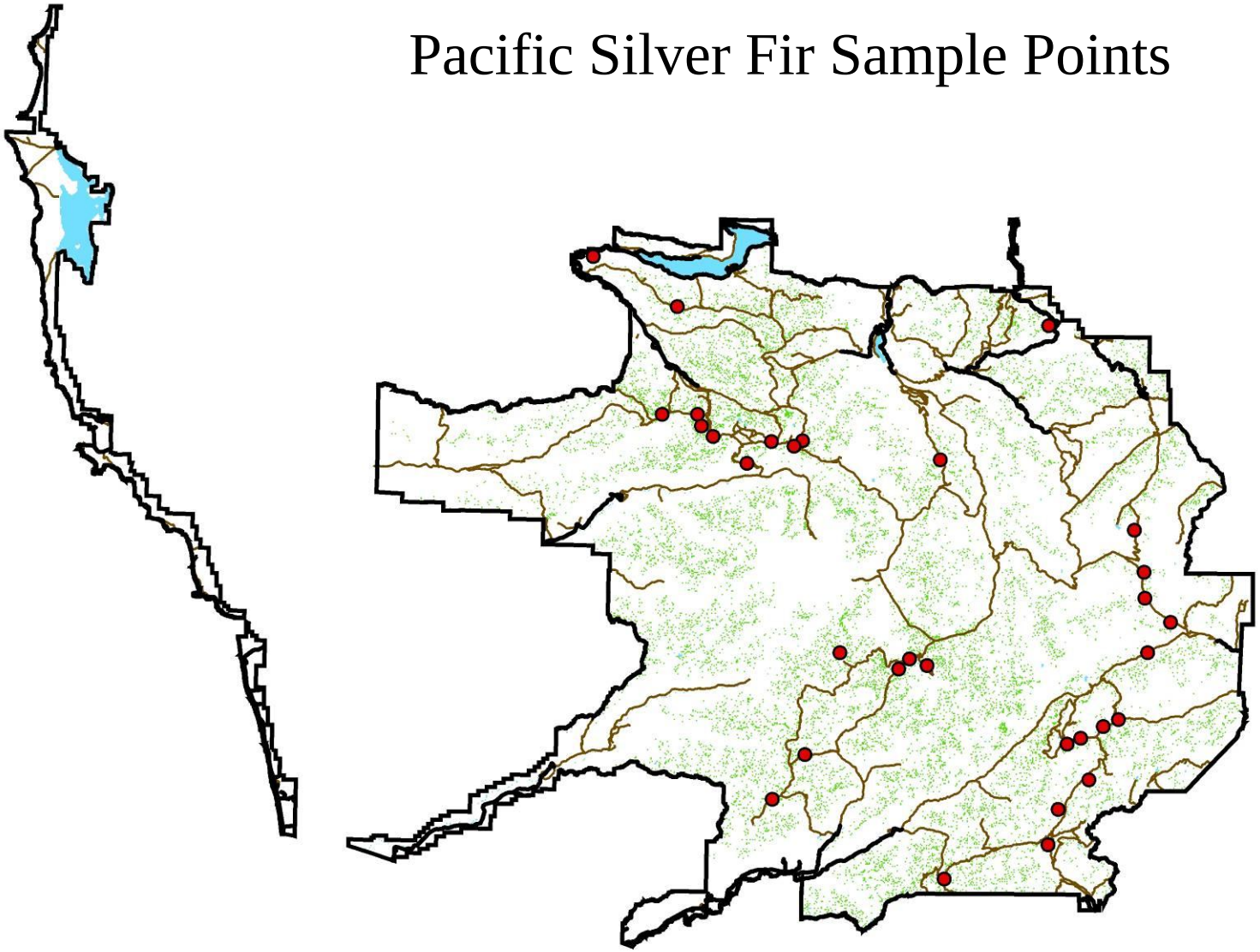

Figure 13. Green shading indicates areas mapped as Pacific Silver Fir in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 31 transects that included at least one of the 84 points were classified as Pacific Silver Fir.

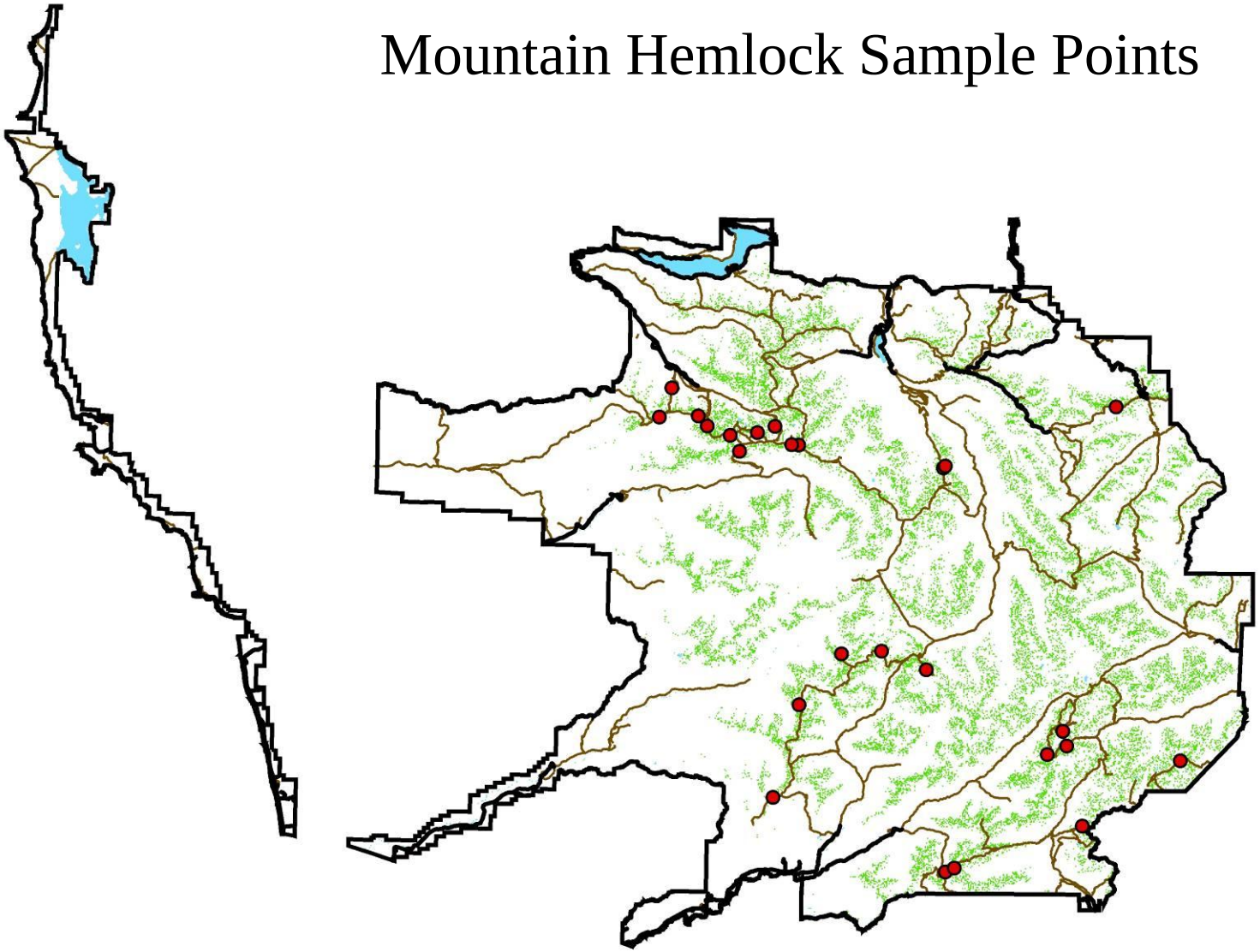

Figure 14. Green shading indicates areas mapped as Mountain Hemlock in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 25 transects that included at least one of the 71 points classified as Mountain Hemlock.

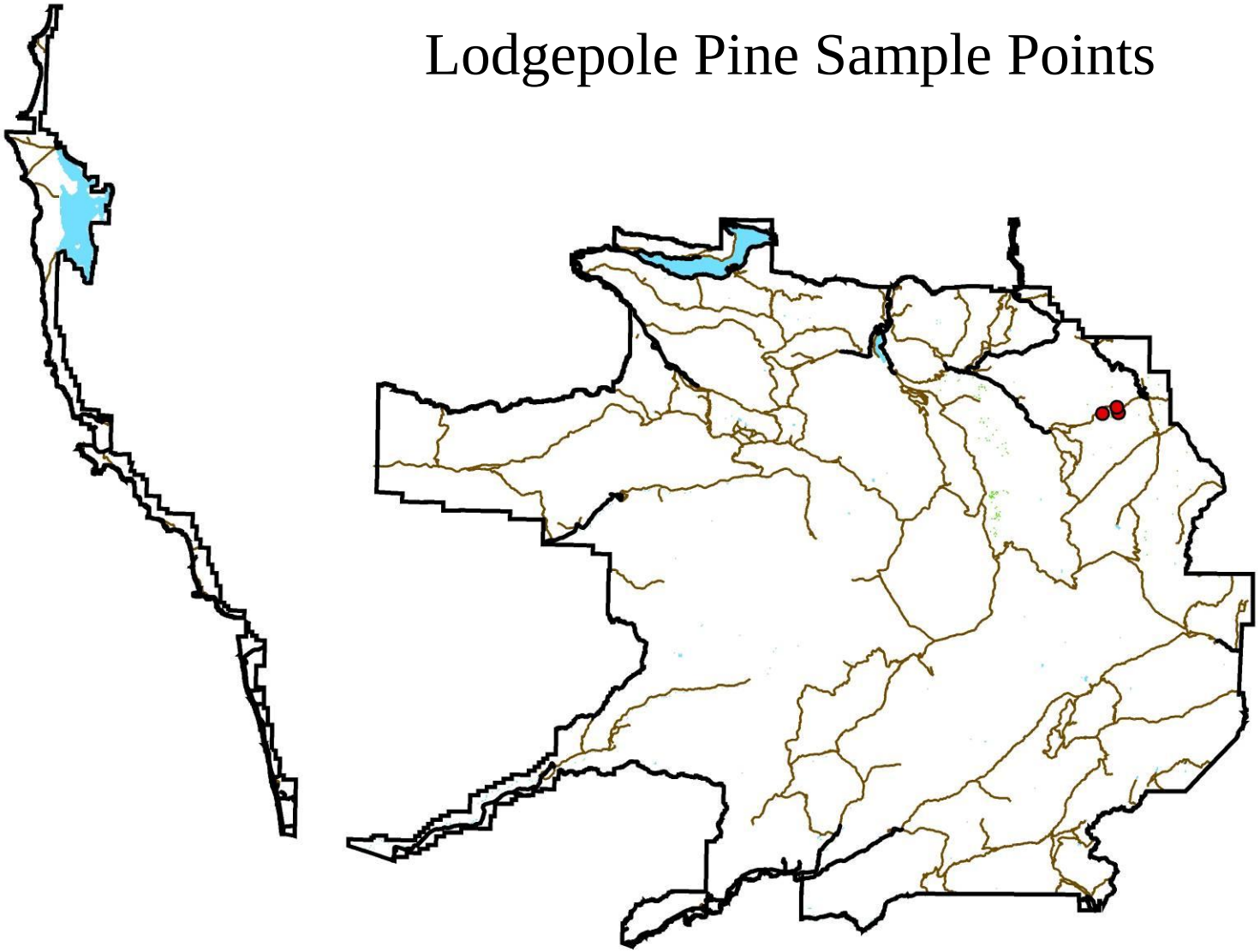

Figure 15. Green shading indicates areas mapped as Lodgepole Pine in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the three transects that included at least one of the nine points classified as Lodgepole Pine.

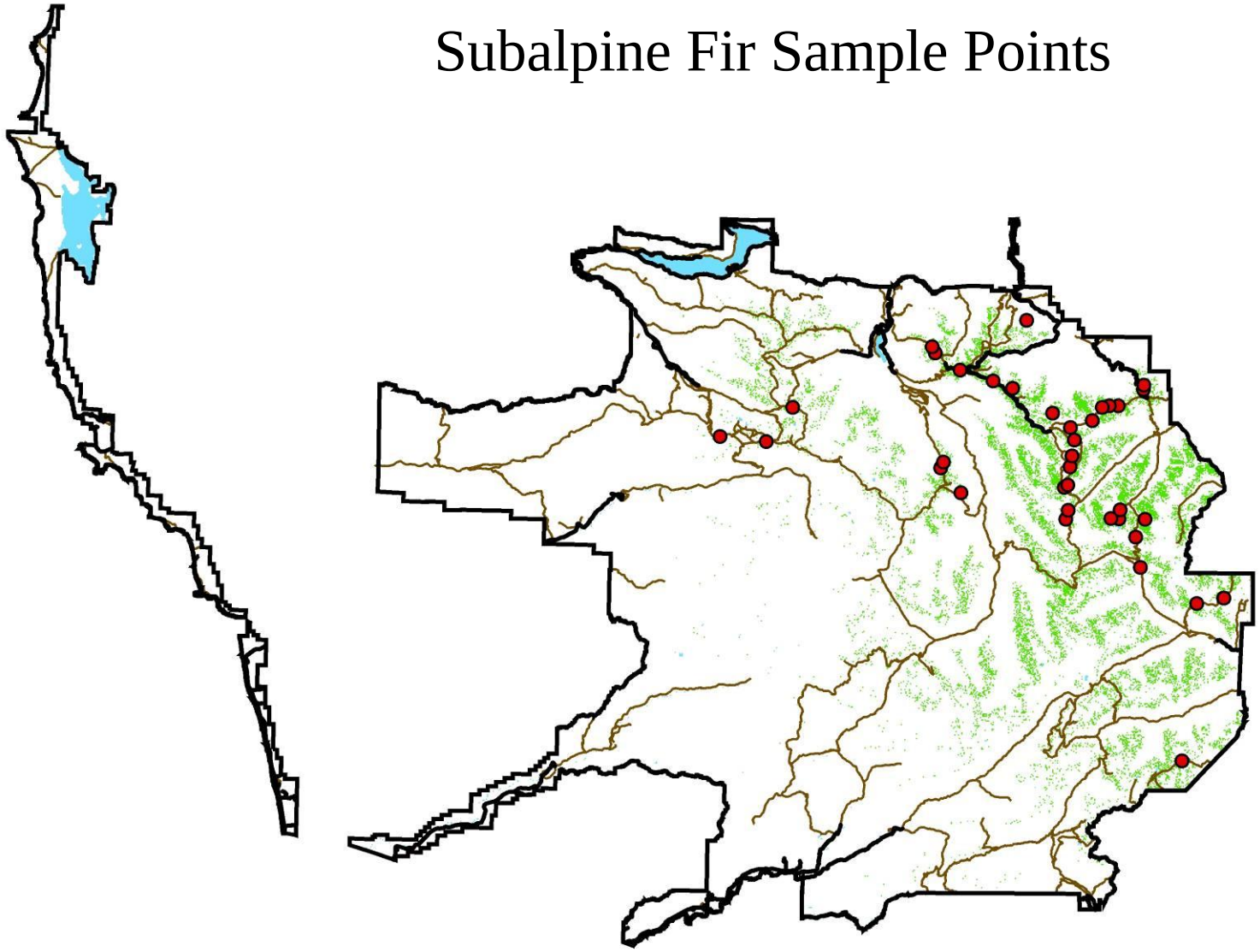

Figure 16. Green shading indicates areas mapped as Subalpine Fir in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 37 transects that included at least one of the 134 points classified as Subalpine Fir.

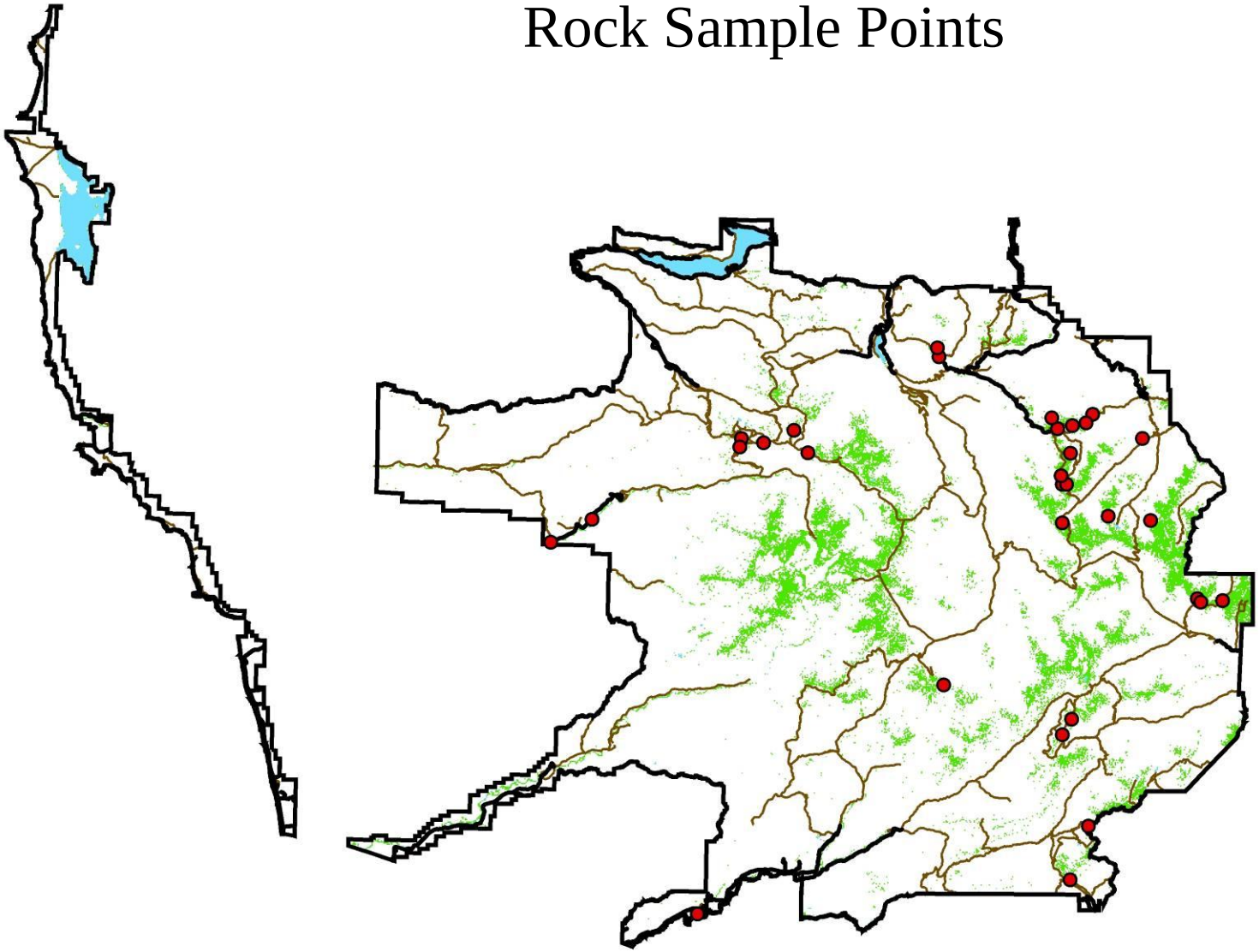

Figure 17. Green shading indicates areas mapped as Rock in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 31 transects that included at least one of the 84 points classified as Rock.

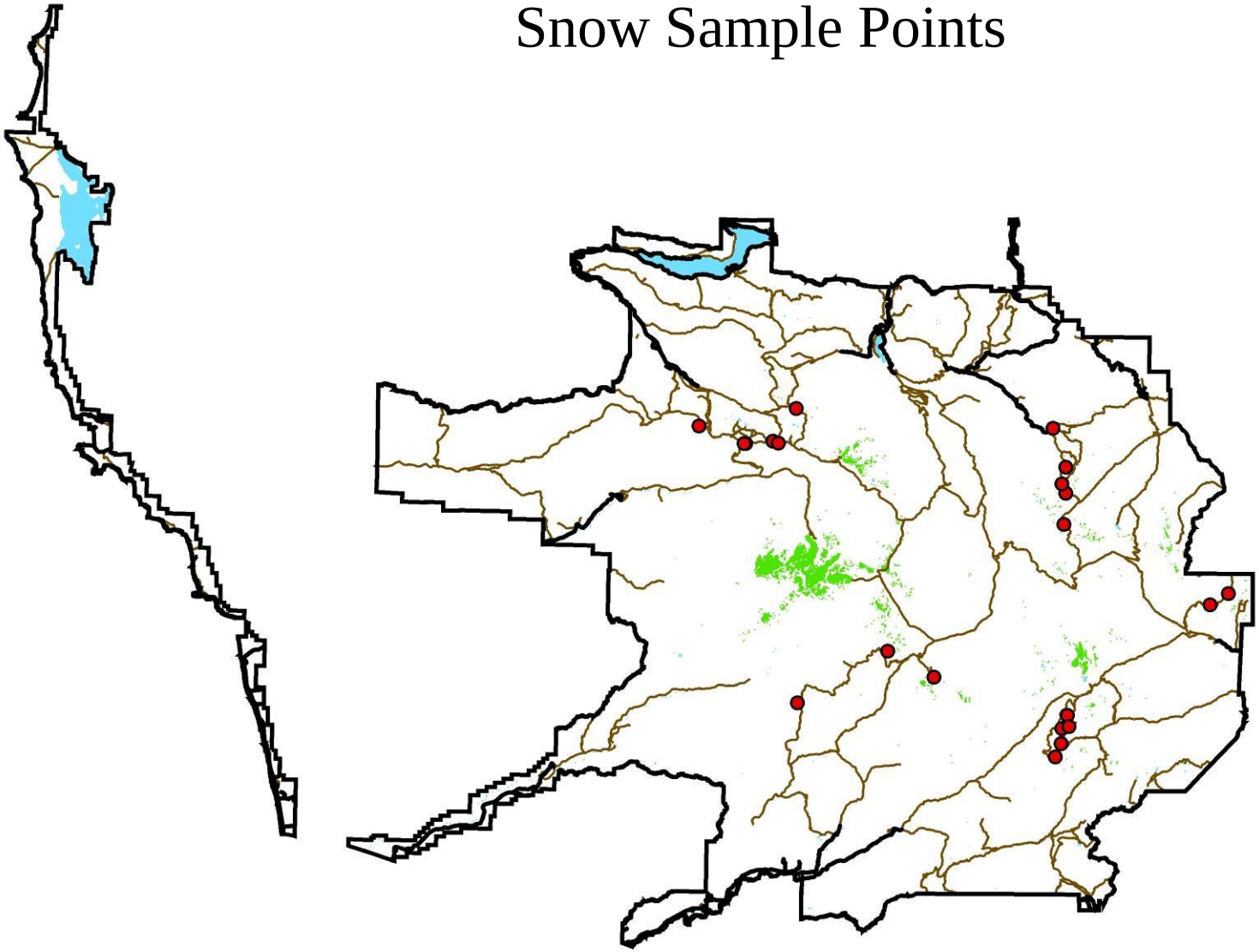

Figure 18. Green shading indicates areas mapped as Snow in the Pacific Meridian Resources (1996) GIS coverage. Red dots indicate the 21 transects that included at least one of the 49 points classified as Snow

Appendix A. Metadata for the Avian Inventory of Olympic National Park

The accompanying CD contains five MS Excel files: ibp_pct.xls, ibp_vega.xls, ibp_vegb.xls, ibp_rare.xls, and ibp_density.xls. This appendix serves as metadata for these files. Note that tables referred to in the field descriptions below are presented at the end of the appendix.

1. POINT COUNT DATA: IBP_PCT.XLS

This file contains all point count data from both the 2002 and 2003 field seasons.

Field: LOC
Description: Identifies the park, OLYM = Olympic National Park.

Field: DATE
Description: The date the point count was conducted (mm/dd/yyyy).

Field: TRANSECT
Description: Identifies transect on which the point was conducted.

Field: POINT
Description: Identifies the point number along the transect.

Field: UNIQPT
Description: Combines transect and 2-digit point number along the transect for each point conducted, providing a unique code for each point. For example, the second point on Transect 2051 would be 205102. **This field may be used to link data in each of the databases on this disk.**

Field: HAB
Description: Signifies the habitat type that the point was classified as in the field. See Table 1 for a list of habitats and their codes.

Field: HABGROUP
Description: Signifies the habitat group the point was placed in for fitting the species-specific detectability functions in Distance. 'Dense' signifies low- and mid-elevation forest; 'sparse' signifies open habitats as well as high-elevation forest.

Field: BIRDOBS
Description: Initials of the point count observer. See Table 6 for full list of observer names.

Field: NOISE
Description: Noise interference, scored from 1 to 5, where 1 = no noise, 2=*gentle babbling brook noise*, probably not missing birds; 3=*babbling creek noise*, might be missing some high-pitched songs/calls of distant birds; 4=*rushing creek noise*, detection radius is probably

substantially reduced; 5=*roaring creek/river noise*, probably detecting only the closest/loudest birds.

Field: TIME
Description: 4-character field indicating the time of day the point count began.

Field: SPEC
Description: 4-character bird species code. See Table 2 for bird species codes.

Field: COMMONNAME
Description: Common name of species coded in SPEC field.

Field: DIST
Description: Horizontal distance in meters to a bird when it was first detected.

Field: PREV
Description: An 'X' indicates that the same individual was recorded on at least two consecutive points counts. The record with the 'X' indicates the point at which the detected individual was at a greater distance from the observer.

Field: FLY
Description: Indicates the number of birds detected as flyovers.

Field: SEENFIRST
Description: 'Y' indicates the distance to the bird was estimated *after* visually locating the bird. 'N' indicates the distance to the bird was estimated without the use of visual cues. **This field was completed only in 2003.**

Field: EVERSANG
Description: 'Y' indicates the bird sang at least once during the five-minute point count. 'N' indicates the bird did not sing during the five-minute point count. **This field was completed only in 2003.**

Field: Interval
Description: '3' indicates the bird was first detected in the first three minutes of the five-minute point count period. '2' indicates the bird was first detected in the last two minutes of the five-minute point count period. **This field was completed only in 2003.**

Field: Flock
Description: Indicates multiple birds in a flock. A blank field indicates a single individual. **This field was completed only in 2003.**

Field: DE
Description: Initials of the data entry person. See Table 6 for full list of data enterer names. **This field was completed only in 2003.**

2. Habitat Data I: ibp_vega.xls

This is one of two files containing habitat data from each of the point count stations visited during the 2002 and 2003 field seasons. Ibp_vega.xls contains data that pertain to the entire vegetation plot, as well as to one of the two intensively sampled subplots (subplot 'A'). Note that some of the *Vaccinium* species can be difficult to identify to species, especially in the late spring/early summer. Data fields indicate our crew members' best attempt to identify the correct species, but some errors may have occurred.

Field: TRANSECT
Description: Identifies transect on which the point was conducted.

Field: POINT
Description: Identifies the point number along the transect.

Field: UNIQPT
Description: Combines transect and the point for each point conducted, providing a unique code for each point. **This field may be used to link data in each of the databases on this disk.**

Field: TRANTYPE
Description: 5-character code identifying the starting point as either supplemental, systematic, or trail. SYST indicates a start point derived from systematic sampling. SUPP indicates a start point located in a habitat deemed to require supplemental sampling, and selected by a different sampling methodology than systematic points. TRAIL indicates a start point derived from trail-based sampling.

Field: HAB
Description: 4-character code identifying the dominant habitat type (for the most part PMR-based) within a 50 m radius of the survey point. See Table 1 for list of habitat codes.

Field: HABNAME
Description: Complete name of each habitat type. See Table 1 for the complete list of habitat names and codes.

Field: HAB2
Description: 4-character code identifying a secondary habitat type (if present) within a 50 m radius of the survey point. See Table 1 for list of habitat codes.

Field: HAB2NAME
Description: Complete name of habitat indicated in HAB2.

Field: DATE
Description: The date the vegetation was sampled (mm/dd/yyyy).

Field: BIRDOBS
Description: Initials of the point count observer. See Table 6 for full list of observer names.

Field: VEGOBS
Description: Initials of the vegetation observer. See Table 6 for full list of observer names.

Field: ASPECT
Description: Compass degrees indicating the dominant aspect of the 50 m radius point count circle.

Field: ELEV_FT
Description: Elevation in feet, as determined by observers from topographic maps in the field.

Field: SLOPE
Description: Average slope (degrees) of the 50 m radius point count circle, measured with a clinometer. **'99' indicates no data were collected in the field.**

Field: ROCKPRES
Description: Y=exposed rock is a substantial enough feature of the habitat to affect bird usage of the area, N=little or no exposed rock.

Field: MOIST
Description: Soil moisture in the 50 m radius circle. 1=dry, 2=moist, 3=wet.

Field: STANDH20
Description: Area (square meters) of the 50 m radius circle covered in standing water.

Field: RUNH20
Description: Index describing running water in the 50 m radius circle. 1=none, 2=trickle, 3=small stream, 4=large stream, 5=river.

Field: LOCSOURCE
Description: Indicates the primary method used to obtain the GPS coordinates in the field: G = GPS unit and map (low-cost Garmin GPS models used), M = map only, T = Trimble GPS Unit and map. These data were collected only during the 2003 field season.

Field: NORTHING
Description: UTM northing (NAD83) of the survey point.

Field: EASTING
Description: UTM easting (NAD83) of the survey point.

Field: GPSERROR
Description: Error in meters of GPS reading, as provided by hand-held GPS unit.

Field: GEOGRAPHY
Description: Indicates the location of the sample point in the park as either occurring in the coastal strip (C) or the interior (I) portions of the park.

Field: OTHERHAB1
Description: 4-character code indicating the presence of other habitat types outside of the 50 m radius circle but within 100 m of the center of the veg plot. See Table 1 for list of habitat names.

Field: OTHERHAB2
Description: 4-character code entered indicating the presence of other habitat types outside of the 50 m radius circle but within 100 m of the center of the veg plot. See Table 1 for list of habitat names.

The following fields, all of which begin with 'A' describe conditions in the first of two 20m x 40m subplots adjacent to the point count station.

Field: APLOTHAB
Description: 4-character code identifying the dominant habitat type within the subplot. See Table 1 for list of habitat codes.

Field: AHERBCAN
Description: Average height (cm) of the herbaceous canopy, if present.

Field: ATREECAN
Description: Average height (m) of the tree canopy, if present.

Field: ATREESCAN
Description: Average height (m) of the tree subcanopy, if present.

Field: ASHRUBCAN
Description: Average height (m) of the shrub canopy, if present.

Field: ASHRUBSCAN
Description: Average height (m) of the shrub subcanopy, if present.

Field: ATREE1ID
Description: 6-letter code (first 3 letters of genus followed by first 3 letters of species) of a plant species covering at least 1% of the subplot, at least 5m above ground. See Table 3 for list of tree codes.

Field: A1CMMNNAME
Description: Indicates the common name of the code entered in ATREE1ID. See Table 3 for list of tree common names.

Field: ATREE123
Description: Count of stems 1-23cm dbh of the species indicated in Atree1id.

Field: ATREE153
Description: Description: Count of stems 24-53cm dbh of the species indicated in Atree1id.

Field: ATREE181
Description: Description: Count of stems 54-81cm dbh of the species indicated in Atree1id.

Field: ATREE1122
Description: Description: Count of stems 82-122cm dbh of the species indicated in Atree1id.

Field: ATREE1123
Description: Count of stems >122 cm dbh of the species listed in Atree1id.

Field: ATREE1HCOV
Description: Percent cover of the species indicated in Atree1id, considering only vegetation greater than 20 m above ground.

Field: ATREE1MCOV
Description: Percent cover of the species indicated in Atree1id, considering only vegetation between 5 and 20 m above ground.

Field: ATREE2ID
Description: 6-letter code (first 3 letters of genus followed by first 3 letters of species) of another plant species covering at least 1% of the subplot, at least 5m above ground. See Table 3 for list of tree codes.

Field: A2CMMNNAME
Description: Indicates the common name of the code entered in ATREE2ID. See Table 3 for list of tree common names.

Fields: ATREE223… ATREE2MCOV
Description: Fields follow the same conventions as above, but applied to the species indicated in Atree2id, rather than Atree1id.

Fields following the same conventions are provided for five additional plant species (Atree3id…Atree7id).

Field: ASHRUBHCOV
Description: Percent cover of the all shrub species (undifferentiated) in the vegetation layer greater than 20 m above ground.

Field: ASHRUBMCOV
Description: Percent cover of the all shrub species (undifferentiated) in the vegetation layer between 5-20 m above ground.

Field: ASNAG23
Description: Number of snags (dead tree, any species, >1.5 m tall) 1-23 cm dbh.

Field: ASNAG53

Description: Number of snags 24-53 cm dbh.

Field: ASNAG81
Description: Number of snags 54-81 cm dbh.

Field: ASNAG122
Description: Number of snags 82-122 cm dbh.

Field: ASNAG123
Description: Number of snags >122 cm dbh.

Field: ADECAY1
Description: Number of logs (>20 cm diameter) crossing the center of the plot, perpendicular to its long axis (such that the observer had to step or climb over them) of decay class 1. Decay classes were defined as follows:

Characteristic	Decay Class 1	Decay Class 2	Decay Class 3
Bark	Mostly intact	Mostly sloughed/sloughing	Absent
3 cm twigs	Present to absent	Absent	Absent
Exposed wood texture	Intact, hard	Large pieces, partly soft	Small pieces, soft
Portion of log on ground	Log supporting itself	Log sagging on ground	Log entirely grounded
Exposed wood color	Original	Original to reddish	Reddish to brown
Epiphytes	None	Conifer seedlings	Moss and conif. sdlng.
Invading roots	None	Shallow seedlings	Roots penetrating
Log x-sectional shape	Round	Round	Oval or collapsed

Field: ADECAY2
Description: Number of logs (>20 cm diameter) crossing the center of the plot, perpendicular to its long axis (such that the observer had to step or climb over them) of decay class 2.

Field: ADECAY3
Description: Number of logs (>20 cm diameter) crossing the center of the plot, perpendicular to its long axis (such that the observer had to step or climb over them) of decay class 3.

Field: ATOTCOVH
Description: Percent cover of all contributing species, considering only vegetation greater than 20 m above ground.

Field: ATOTCOVM
Description: Percent cover of all contributing species, considering only vegetation between 5 and 20 m above ground.

Field: AWVTOTCOV
Description: Percent cover of all contributing species (tree or shrub), considering only vegetation between 1 and 5 m above ground.

Field: ASHRUBONLY
Description: Percent cover of all shrub species, considering only vegetation between 1 and 5 m above ground.

Field: AWV1ID
Description: 6-letter code (first 3 letters of genus followed by first 3 letters of species) of a plant species covering at least 1% of the subplot, considering only vegetation between 1 and 5 m above ground. See Table 4 for shrub species list.

Field: A1SCMNNAME
Description: Indicates the common name of the species entered in AWV1ID. See Table 4 for list of shrub common names and codes.

Field: AWV1COV
Description: Considering only vegetation between 1 and 5 m above ground, percent cover of species indicated in Awv1id.

Field: AWV1HT
Description: Avg. ht (m) of species indicated in Awv1id.

Fields following the same conventions are provided for 6 more plant species (AWV2ID-AWV2HT; AWV3ID-AWV3HT;…AWV7ID-AWV7HT).

Field: AWVTREESCO
Description: Considering only vegetation between 1 and 5 m above ground, percent cover of all tree species (undifferentiated) present.

The following fields all refer to ground cover below 0.1 m above ground.

Field: ASNOW
Description: Percent of ground covered by snow.

Field: AWATER
Description: Percent of ground covered by standing or running water.

Field: AROCK
Description: Percent of ground comprised of exposed rock.

Field: ABARE
Description: Percent of ground comprised of bare soil.

Field: ALITTER
Description: Percent of ground covered by organic litter.

Field: ADW

Description: Percent of ground covered by downed wood.

Field: AGRASS
Description: Percent of ground covered by grass.

Field: ASEDGE
Description: Percent of ground covered by sedge.

Field: AFORB
Description: Percent of ground covered by forbs.

Field: AFERN
Description: Percent of ground covered by ferns.

Field: ASHRUB
Description: Percent of ground covered by shrubs.

Field: ATREE
Description: Percent of ground covered by tree foliage.

Field: AMOSS
Description: Percent of ground covered by moss.

Field: AOTHER1ID
Description: One-word description of any additional ground cover item.

Field: AOTHER1COV
Description: Percent of ground covered by item indicated in Aother1id.

Field: AH1ID
Description: 6-letter code (first 3 letters of genus followed by first 3 letters of species) of a Henderson's ground cover plant species present in subplot. See Table 5 for Henderson's species list.

Field: AH1CMNNAME
Description: Indicates the common name of the species entered in AH1ID. See Table 5 for Henderson's species list.

Field: AH1COV
Description: Percent of ground covered by item indicated in AH1ID. Can be indicated as present if presence is all that Henderson requires. See Table 5 for Henderson's percent coverage requirements.

Field: AH2ID

Description: 6-letter code (first 3 letters of genus followed by first 3 letters of species) of a Henderson's ground cover plant species present in subplot. See Table 5 for Henderson's species list.

Field: AH2CMNNAME
Description: Indicates the common name of the species entered in AH2ID. See Table 5 for Henderson's species list.

Field: AH2COV
Description: Percent of ground covered by item indicated in AH2ID. Can be indicated as present if presence is all that Henderson requires. See Table 5 for Henderson's percent coverage requirements.

Field: AH3ID
Description: 6-letter code (first 3 letters of genus followed by first 3 letters of species) of a Henderson's ground cover plant species present in subplot. See Table 5 for Henderson's species list.

Field: AH3CMNNAME
Description: Indicates the common name of the species entered in AH3ID. See Table 5 for Henderson's species list.

Field: AH3COV
Description: Percent of ground covered by item indicated in AH3ID. Can be indicated as present if presence is all that Henderson requires. See Table 5 for Henderson's percent coverage requirements.

Field: AH4ID
Description: 6-letter code (first 3 letters of genus followed by first 3 letters of species) of a Henderson's ground cover plant species present in subplot. See Table 5 for Henderson's species list.

Field: AH4CMNNAME
Description: Indicates the common name of the species entered in AH4ID. See Table 5 for Henderson's species list.

Field: AH4COV
Description: Percent of ground covered by item indicated in Ah4cov. Can be indicated as present if presence is all that Henderson requires. See Table 5 for Henderson's percent coverage requirements.

Field: ACOMPLETE
Description: 'Y' indicates all data for the subplot were collected. 'N' indicates some data for the subplot were missing. **This field was completed only in 2003.**

Field: ADESCRIBE

Description: Describes data missing in subplot for records with an 'N' in Acomplete. **This field was completed only in 2003.**

Field: DENNORTH
Description: Number of open vertices (out of 96 possible) on the spherical densiometer face, when the observer was facing north. **999 signifies no data were collected.**
Field: DENEAST
Description: Number of open vertices (out of 96 possible) on the spherical densiometer face, when the observer was facing east. **999 signifies no data were collected.**

Field: DENSOUTH
Description: Number of open vertices (out of 96 possible) on the spherical densiometer face, when the observer was facing south. **999 signifies no data were collected.**

Field: DENWEST
Description: Number of open vertices (out of 96 possible) on the spherical densiometer face, when the observer was facing west. **999 signifies no data were collected.**

Field: DE
Description: Initials of the data entry person. See Table 6 for full list of data enterer names. **This field was completed only in 2003.**

3. Habitat Data II: ibp_vegb.xls

The file ibp_vegb.xls contains data pertaining to the second of the two vegetation subplots (subplot 'B') associated with each point count station. The first field, 'UNIQPT' serves as a link to each of the other databases. The remaining fields are identical to their counterparts in ibp_vega.xls, except they all begin with 'B'.

4. Rare Bird Data: ibp_rare.xls

This file contains documentation of notable, unexpected, or otherwise poorly documented species that our crews detected in the park at times other than during point counts.

Field: SPEC
Description: 4-character bird species code. See Table 2 for key to bird species codes.

Field: COMMONNAME
Description: Common name of species coded in SPEC field.

Field: OBSERVER
Description: Initials of the rare bird observer. MOB = Many Observers; see Table 6 for all other observer names.

Field: DATE
Description: The date the bird was observed (mm/dd/yyyy).

Field: Quantity
Description: The number of birds detected of the indicated species.

Field: NORTHING
Description: UTM northing (NAD83) of the detection.

Field: EASTING
Description: UTM easting (NAD83) of the detection.

Field: TRANSECT
Description: Transect an individual was detected if detected along a transect.

Field: DETAILS
Description: Details regarding encounter and identification of species.

4. Species- and habitat-specific density estimates: ibp_density.xls

This file contains habitat-specific density estimates and associated information for all species detected during point counts.

Field: HAB
Description: 4-letter habitat code. See Table 1 for a list of habitats and their codes.

Field: HABNAME
Description: Complete name of each habitat type. See Table 1 for the complete list of habitat names and codes.

Field: SPEC
Description: 4-character bird species code. See Table 2 for bird species codes.

Field: COMMONNAME
Description: Common name of species coded in SPEC field.

Field: ALLDETS:
Description: Number of individual detections of indicated species in indicated habitat, excluding flyovers.

Field: PTSWUNLDET
Description: Number of points at which the species was detected (includes flyovers).

Field: PRCNTWUNLD
Description: Percent of points in the indicated habitat at which the species was detected.

Field: UNADJDENS

Description: Unadjusted density, based on the number of detections within 50 m of the observer, **with no adjustment for detectability.**

Field: ADJDENS
Description: Adjusted density, calculated using Distance 4.0 Release 2.

Field: PERCENTCV
Description: Coefficient of variation of the density estimate, expressed as a percentage.

Field: DF
Description: Degrees of freedom of the density estimate.

Field: LOW95CI
Description: Lower bound of the 95% confidence interval of the density estimate.

Field: HIGH95CI
Description: Upper bound of the 95% confidence interval of the density estimate.

Appendix A, Table 1. Olympic National Park habitat list.

Habitat Type	Code
Water	WATE
Rock	ROCK
Snow	SNOW
Meadow/Heather	MEHE
Low-elevation Shrub	LESH
Douglas-fir	DOFI
West-side Western Hemlock	WWHE
East-side Western Hemlock	EWHE
Mountain Hemlock	MOHE
Pacific Silver Fir	PASF
Subalpine Fir	SUBF
Conifer Deciduous Mix	CODM
Western Redcedar/Western Hemlock	WRCH
Western Redcedar	WERC
Alaska Yellowcedar	YECE
Lodgepole Pine	LOPI
Hardwood Mix Forest	HAMI
Sitka Spruce	SISP
High-elevation Shrub	HEAS
Bigleaf Maple	BIGM
Red Alder	REAL
Recent Fire Area	BURN
Low Elevation Meadow	LEME

Appendix A, Table 2. Olympic National Park bird species codes.

Common Name	Code	Common Name	Code
American Crow	AMCR	Common Merganser	COME
American Dipper	AMDI	Common Nighthawk	CONI
American Goldfinch	AMGO	Common Raven	CORA
American Kestrel	AMKE	Common Yellowthroat	COYE
American Pipit	AMPI	Double-crested Cormorant	DCCO
American Robin	AMRO	Dark-eyed Junco	DEJU
Bald Eagle	BAEA	Downy Woodpecker	DOWO
Barrow's Goldeneye	BAGO	European Starling	EUST
Barn Swallow	BARS	Evening Grosbeak	EVGR
Black-capped Chickadee	BCCH	Fox Sparrow	FOSP
Barred Owl	BDOW	Great Blue Heron	GBHE
Belted Kingfisher	BEKI	Golden-crowned Kinglet	GCKI
Brown-headed Cowbird	BHCO	Gray-crowned Rosy-Finch	GCRF
Black-headed Grosbeak	BHGR	Golden-crowned Sparrow	GCSP
Black Oystercatcher	BLOY	Gray Jay	GRAJ
Blue Grouse	BLUG	Greater Scaup	GRSC
Bonaparte's Gull	BOGU	Greater Yellowlegs	GRYE
Brown Creeper	BRCR	Glaucous-winged Gull	GWGU
Brown Pelican	BRPE	Hammond's Flycatcher	HAFL
Band-tailed Pigeon	BTPI	Harlequin Duck	HARD
Black-throated Gray Warbler	BTYW	Hairy Woodpecker	HAWO
Bufflehead	BUFF	Hermit Thrush	HETH
Canada Goose	CAGO	Hermit or Townsend’s Warbler	HETO
California Quail	CAQU	Horned Lark	HOLA
Caspian Tern	CATE	Hooded Merganser	HOME
Cassin's Vireo	CAVI	Hutton's Vireo	HUVI
Chestnut-backed Chickadee	CBCH	Killdeer	KILL
Cedar Waxwing	CEDW	Least Sandpiper	LESA
Chipping Sparrow	CHSP	Marbled Godwit	MAGO
Clark's Nutcracker	CLNU	Mallard	MALL
Cliff Swallow	CLSW	Marbled Murrelet	MAMU

Appendix A, Table 2. Olympic National Park bird species codes (continued).

Common Name	Code	Common Name	Code
Marsh Wren	MAWR	Song Sparrow	SOSP
MacGillivray's Warbler	MGWA	Spotted Owl	SPOW
Mourning Dove	MODO	Spotted Sandpiper	SPSA
Northern Flicker	NOFL	Spotted Towhee	SPTO
Northern Goshawk	NOGO	Sharp-shinned Hawk	SSHA
Northern Pygmy-Owl	NOPO	Steller's Jay	STJA
Northern Rough-winged Swallow	NRWS	Swainson's Thrush	SWTH
Orange-crowned Warbler	OCWA	Townsend's Solitaire	TOSO
Olive-sided Flycatcher	OSFL	Townsend's Warbler	TOWA
Osprey	OSPR	Tree Swallow	TRES
Pelagic Cormorant	PECO	Turkey Vulture	TUVU
Pectoral Sandpiper	PESA	Vaux's Swift	VASW
Pine Grosbeak	PIGR	Varied Thrush	VATH
Pigeon Guillemot	PIGU	Violet-green Swallow	VGSW
Pine Siskin	PISI	Virginia Rail	VIRA
Pileated Woodpecker	PIWO	Warbling Vireo	WAVI
Pacific-slope Flycatcher	PSFL	White-crowned Sparrow	WCSP
Purple Finch	PUFI	Western Gull	WEGU
Ring-billed Gull	RBGU	Western Sandpiper	WESA
Red-breasted Merganser	RBME	Western Tanager	WETA
Red-breasted Nuthatch	RBNU	Western Wood-Pewee	WEWP
Red-breasted Sapsucker	RBSA	Whimbrel	WHIM
Ruby-crowned Kinglet	RCKI	Willow Flycatcher	WIFL
Red Crossbill	RECR	Wilson's Warbler	WIWA
Red-naped Sapsucker	RNSA	Winter Wren	WIWR
Red-tailed Hawk	RTHA	Wood Duck	WODU
Ruffed Grouse	RUGR	White-winged Scoter	WWSC
Rufous Hummingbird	RUHU	Yellow-rumped Warbler	YRWA
Red-winged Blackbird	RWBL	Yellow Warbler	YWAR
Savannah Sparrow	SAVS		

Appendix A, Table 3. Olympic National Park tree species code list.

Common Name	Scientific Name[1]	Code
Pacific Silver fir	*Abies amabalis*	ABIAMA
Grand Fir	*Abies grandis*	ABIGRA
Subalpine Fir	*Abies lasiocarpa*	ABILAS
Vine Maple	*Acer circinatum*	ACECIR
Douglas Maple	*Acer glabrum*	ACEGLA
Big-leaf Maple	*Acer macrophyllum*	ACEMAC
Red Alder	*Alnus rubra*	ALNRUB
Madrone	*Arbutus menziesii*	ARBMEN
Alaska Yellow Cedar	*Chamaecyparis nootkatensis*	CHANOO
Pacific Dogwood	*Cornus nuttallii*	CORNUT
Pacific Crabapple	*Malus fusca*	MALFUS
Engelmann Spruce	*Picea engelmannii*	PICENG
Sitka Spruce	*Picea sitchenchis*	PICSIT
Whitebark Pine	*Pinus albicaulis*	PINALB
Lodgepole Pine	*Pinus contorta*	PINCON
Western White Pine	*Pinus monticola*	PINMON
Ponderosa Pine	*Pinus ponderosa*	PINPON
Black Cottonwood	*Populus balsamifera*	POPBAL
Quaking Aspen	*Populus tremuloides*	POPTRE
Douglas Fir	*Pseudotsuga menziesii*	PSEMEN
Garry Oak	*Quercus garryana*	QUEGAR
Cascara	Rhamnus purshiana	RHAPUR
Unknown Willow	*Salix sp*	SALSP
Western Yew	*Taxus brevifolia*	TAXBRE
Western Red Cedar	*Thuja plicata*	THUPLI
Western Hemlock	*Tsuga heterophylla*	TSUHET
Mountain Hemlock	*Tsuga mertensiana*	TSUMER

[1]Scientific names follow Pojar and Mackinnon (1994) and/or Buckingham et al. (1995).

Appendix A, Table 4. Olympic National Park list of plant species included in shrub fields of database.

Common Name	Scientific Name[1]	Code
Vine Maple	*Acer circinatum*	ACECIR
Douglas Maple	*Acer glabrum*	ACEGLA
Unknown Acer	*Acer sp*	ACESP
Vanilla Leaf	*Achlys triphylla*	ACHTRI
Maidenhair fern	*Adiantun pedatum*	ADIPED
Sitka Alder	*Alnus crispa*	ALNCRI
Red Alder	*Alnus rubra*	ALNRUB
Sitka Alder	*Alnus sinuata*	ALNSIN
Serviceberry	*Amelanchier alnifolia*	AMEALN
Hairy Manzanita	*Arctostapylos columbiana*	ARCCOL
Kinnikinnick	*Arctostapylos uva-ursi*	ARCUVA
Lady Fern	*Athyrium filix-femina*	ATHFIL
Tall Oregon Grape	*Beberis aquifolium*	BEBAQU
Cascade Oregon Grape	*Beberis nervosa*	BERNER
Unknown Oregon Grape		BERSP
Deer Fern	*Blechnum spicant*	BLESPI
White Mountain Heath	*Cassiope mertensiana*	CASMER
Redstem Ceanothus	*Ceanothus sanguineus*	CEASAN
Mountain Ceanothus	*Ceanothus velutinous*	CEAVEL
Prince's Pine	*Chimaphila umbellata*	CHIUMB
Copperbush	*Cladothamnus pyroliflorus*	CLAPRY
Queen's Cup	*Clintonia uniflora*	CLIUNI
Bunchberry	*Cornus canadensis*	CORCAN
Hazelnut	*Corylus cornuta*	CORCOR
Pacific Dogwood	*Cornus nuttallii*	CORNUT
Red-oiser Dogwood	*Cornus stolonifera*	CORSTO
Bunchberry	*Cornus unalaschkensis*	CORUNA
Black Hawthorn	*Crataegus douglasii*	CRADOU
Scotch Broom	*Cytisus scoparius*	CYTSCO
Unknown Lily	*Erythronium sp*	ERYSP

Appendix A, Table 4. Olympic National Park list of plant species included in shrub fields of database (continued).

Common Name	Scientific Name[1]	Code
Fern		FERN
Forb		FORB
Alpine Teaberry	*Gaultheria humifusa*	GAUHUM
Slender Teaberry	*Gaultheria ovatifolia*	GAUOVA
Salal	*Gaultheria shallon*	GAUSHA
English Ivy	*Hedra helix*	HEDHEL
Ocean Spray	*Holodiscus discolor*	HOLDIS
Juniper	*Juniperus communis*	JUNCOM
Bog Laurel	*Kalmia microphylla*	KALMIC
Labrador Tea	*Ledum groenlandicum*	LEDGRO
Twinflower	*Linnaea borealis*	LINBOR
Orange Honeysuckle	*Lonicera ciliosa*	LONCIL
Hairy Honeysuckle	*Lonicera hispidula*	LONHIS
Black Twinberry	*Lonicera involucrata*	LONINV
Utah Honeysuckle	*Lonicera utahensis*	LONUTA
Unknown Lupine	*Lupinus sp*	LUPSP
Subalpine Lupine	*Lupinus subalpinus*	LUPSUB
Skunk Cabbage	*Lysichiton americanum*	LYSAME
Pacific Crab Apple	*Malus fusca*	MALFUS
False Azalaea	*Menziesia ferruginea*	MENFER
Sweet Gale	*Myrica gale*	MYRGAL
Indian Plum	*Oemleria cerasiformis*	OEMCER
Devil's Club	*Oplopanax horridus*	OPLHOR
Mountain Boxwood	*Pachistima myrsinites*	PACMYR
Mock Orange	*Philadelphus lewisii*	PHILEW
Pacific Ninebark	*Physocarpus capitatus*	PHYCAP
Pink Mtn Heather	*Phyllodoce emptriformis*	PHYEMP
Yellow Mtn Heather	*Phyllodoce glanduliflora*	PHYGLA
Sword Fern	*Polystichum munitum*	POLMUN
Cinquefoil	*Potentilla diversifolia*	POTDIV
Shrubby Cinquefoil	*Potentilla fruticosa*	POTFRU
Bitter Cherry	*Prunus emarginata*	PRUEMA

Appendix A, Table 4. Olympic National Park list of plant species included in shrub fields of database (continued).

Common Name	Scientific Name[1]	Code
Bracken Fern	*Pteridium aquilinum*	PTEAQU
Cascara	*Rhamnus purshiana*	RHAPUR
White Rhododendron	*Rhododendron albiflorum*	RHOALB
Pacific Rhododendron	*Rhododendron macrophyllum*	RHOMAC
Stink Currant	*Ribes bracteosum*	RIBBRA
Black Gooseberry	*Ribes lacustre*	RIBLAC
Red-flowering Currant	*Ribes sanguineum*	RIBSAN
Unknown Ribes	*Ribes sp*	RIBSP
Unknown Ribes	*Ribes spp*	RIBSPP
Baldhip Rose	*Rosa gymnocarpa*	ROSGYM
Nootka Rose	*Rosa nutkana*	ROSNUT
Unknown Rose	*Rosa sp*	ROSSP
Himalayan Blackberry	*Rubus discolor*	RUBDIS
Evergreen Blackberry	*Rubus laciniatus*	RUBLAC
Dwarf Bramble	*Rubus lasiococcus*	RUBLAS
Western Blackcap	*Rubus leucodermis*	RUBLEU
Snow Blackberry	*Rubus nivalis*	RUBNIV
Western Thimbleberry	*Rubus parviflorus*	RUBPAR
Five-leaved Blackberry	*Rubus pedatus*	RUBPED
Unknown Rubus	*Rubus sp*	RUBSP
Salmonberry	*Rubus spectabilis*	RUBSPE
Pacific Blackberry	*Rubus ursinus*	RUBURS
Unknown Willow	*Salix Sp*	SALSP
Blue Elderberry	*Sambucus caerulea*	SAMCER
Red Elderberry	*Sambucus racemosa*	SAMRAC
Unknown Sedge	*Carex spp*	SEDGE
Star-flowered Solomon's Seal	*Smilacina stellata*	SMISTE
Western Mtn Ash	*Sorbus scopulina*	SORSCO
Sitka Mtn Ash	*Sorbus sitchensis*	SORSIT
Birch-leaf Spirea	*Spiraea betulifolia*	SPIBET
Subalpine Spirea	*Spiraea densiflora*	SPIDEN
Common Snowberry	*Symphoricarpos albus*	SYMALB

Appendix A, Table 4. Olympic National Park list of plant species included in shrub fields of database (continued).

Common Name	Scientific Name[1]	Code
Snowberry	*Symphoricarpos spp*	SYMSP
Unknown Snowberries	*Symphoricarpos sp*	SYMSPP
Western Yew	*Taxus brevifolia*	TAXBRE
Trees		TREES
Unknown		UNKNOW
Stinging Nettle	*Urtica dioica*	URTDIO
Unknown Shrub		USHRUB
Alaska Huckleberry	*Vaccinium alaskaense*	VACALA
Dwarf Huckleberry	*Vaccinium caespitosum*	VACCES
Blue-leaved Huckleberry	*Vaccinium deliciosum*	VACDEL
Thin-leaved Huckleberry	*Vaccinium membranaceum*	VACMEM
Oval-leaved Huckleberry	*Vaccinium ovalifolium*	VACOVL
Evergreen Huckleberry	*Vaccinium ovatum*	VACOVT
Wild Cranberry	*Vaccinium oxycoccos*	VACOXY
Red Huckleberry	*Vaccinium parvifolium*	VACPAR
Unknown Vaccinium	*Vaccinium sp*	VACSP
Unknown Vacciniums	*Vaccinium spp*	VACSPP
Bog Huckleberry	*Vaccinium uliginosum*	VACULI
Whipplevine	*Whipplea modesta*	WHIMOD

[1]Scientific names follow Pojar and Mackinnon (1994) and/or Buckingham et al. (1995).

Appendix A, Table 5. Olympic National Park Henderson's ground cover plant species code list.

Common Name	Scientific Name[1]	Code
Vinemaple - present	*Acer circinatum*	ACECIR
Vanilla leaf - 1%	*Achlys triphylla*	ACHTRI
Kinnikinnick - 5%	*Arctostaphylos uva-ursi*	ARCUVA
Dull Oregon Grape	*Berberis nervosa*	BERNER
Oregon Grape - present	*Berberis sp.*	BERSP
Deer fern - 1%	*Blechnum spicant*	BLESPI
Queen's cup - present	*Clintonia uniflora*	CLIUNI
Bunchberry - present	*Cornus canadensis*	CORCAN
Avalanche Lily - 1%	*Erythronium grandiflorum*	ERYGRA
Avalanche Lily	*Erythronium montanum*	ERYMON
Western Fescue - 1%	*Festuca occidentalis*	FESOCC
Unknown Bedstraw	*Galium sp*	GALSP
Fragrant Bedstraw - present	*Galium triflorum*	GALTRI
Salal - 5%	*Gaultheria shallon*	GAUSHA
Oceanspray - 2%	*Holodiscus discolor*	HOLDIS
Common Juniper - 3%	*Juniperus communis*	JUNCOM
Twinflower - 3%	*Linnaea borealis*	LINBOR
Unknown Lupine	*Lupinus sp*	LUPSP
Subalpine Lupine - 3%	*Lupinus subalpinus*	LUPSUB
Skunk Cabbage - 5%	*Lysichiton americanum*	LYSAME
Devil's Club - 5%	*Oplopanax horridus*	OPLHOR
Oxalis - 5%	*Oxalis sp.*	OXASP
Red heather - 10%	*Phyllodoce empetriformis*	PHYEMP
Swordfern - 3%	*Polystichum munitum*	POLMUN
White Rhododendron - 5%	*Rhododendron albiflorum*	RHOALB
Pacific Rhododendron - 5%	*Rhododendron macrophyllum*	RHOMAC
Baldhip Rose - 5%	*Rosa gymnocarpa*	ROSGYM
5-leaved bramble - present	*Rubus pedatus*	RUBPED
Star-flowered Solomon's seal -	*Smilacina stellata*	SMISTE
Rosy twisted-stalk - present	*Streptopus roseus*	STRROS
Snowberry	*Symphoricarpos sp*	SYMSP
Foamflower - present	*Tiarella trifoliata*	TIATRI

Appendix A, Table 5. Olympic National Park Henderson's ground cover plant species code list (continued).

Common Name	Scientific Name[1]	Code
Alaska Huck - present	*Vaccinium alaskaense*	VACALA
Blue-leaf Huck - 10%	*Vaccinium deliciosum*	VACDEL
Big Huck - 5%	*Vaccinium membranaceum*	VACMEM
Ova-leaf Huck	*Vaccinium ovalifolium*	VACOVL
Evergreen Huck - 4%	*Vaccinium ovatum*	VACOVT
Red Huck - present	*Vaccinium parvifolium*	VACPAR
Unknown Vaccinium	*Vaccinium sp*	VACSP
Beargrass - 2%	*Xerophyllum tenax*	XERTEN

[1]Scientific names follow Pojar and Mackinnon (1994) and/or Buckingham et al. (1995).

Appendix A, Table 6. Field observers' names and initials.

Name	Initials
Bob Wilkerson	BW
Rodney Siegel	RS
Heidi Pedersen	HP
Margaret Eng	ME
Heather Bryan	HB
Dan Baxter	DB
Amy Hudnor	AH
Claire Eldridge	CE
Naira Johnston	NJ
Jeff Volk	JV
Chris Chutter	CC
Arden Thomas	AT
Matthew Bauer	MB
Alexia Allen	AA

Appendix B. Field forms

Olympic National Park 2003 VCP Point Count Form page____of_____

Transect_________ Date____/____/____ Observer______ Weather____

Starting Northing ☐☐☐☐☐☐☐

Starting Easting ☐☐☐☐☐☐

Starting Direction:______ Offset (Y, N):____

Ending Northing ☐☐☐☐☐☐☐

Ending Easting ☐☐☐☐☐☐

Protocol (**n**ormal, **r**estrict. hab, **t**rail, **m**ixed—on & offtrail, **d**eliberate):______

TURNS

Pt. #	New Dir.

Notes:
____

____

Pt	N[1]	Start Time	Species	Dist.	Flyover (count)	Seen First	Ever Sang	I[2]	Pt	N[1]	Start Time	Species	Dist.	Flyover (count)	Seen First	Ever Sang	I[2]

[1]Noise: 1=*no noise*; 2=*gentle babbling brook noise*, probably not missing birds; 3=*babbling creek noise*, might be missing some high-pitched songs/calls of distant birds; 4=*rushing creek noise*, detection radius is probably substantially reduced; 5=*roaring creek/river noise*, probably detecting only the closest/loudest birds.
[2]Interval: 3=first detected during first three minutes of point count; 2=first detected during last two minutes of point count.

Olympic National Park Point Count Vegetation Sheet

Point:_____ Hab:_____ Hab2 (optional):_____ Date:___/___/___ Bird Obs:_____ Veg Obs:_____ Aspect (°):_____

Slope(°):_____ Rock (y or n):_____ Moisture (1-3):____ Std H_2O (sq.-m):_____ Run H_2O (1-5):____ Elev:_____(___ft ___m)

Location Source:____(G, T, M) Northing: __ __ __ __ __ __ __ Easting: __ __ __ __ __ __ GPS error:_____(m) **NAD 83 DATUM**

Hend. Dom Tree:_____ Dom-S/GC1: _____ Dom-S/GC2:_____ Other Habs W/in. 100 m:_____, _____

Plot 1 Habitat:_____ Avg. tree canopy ht.:_____m Avg. shrub canopy ht.:_____m

Avg. herb canopy ht.:_____cm Avg. tree sub-canopy ht.:_____m Avg. shrub sub-canopy ht.:_____m

Tree Species	0-23 cm	24-53 cm	54-81 cm	82-122 cm	>122 cm	Cov > 20 m	Cov 5-20 m
						%	%
						%	%
						%	%
						%	%
						%	%
						%	%
SHRUBS						%	%
Snags (>1.5m tall)							
Logs > 20cm DBH	Decay =1		Decay=2		Decay=3	**Total Cover**	%	%

Woody Vegetation between 0.1 m and 5.0 m

Total Cover:_____% Shrub Cover Only:_____%

Species	Cover	Avg. Ht. (m)
	%	
	%	
	%	
	%	
	%	
	%	
	%	
TREES	%	

Ground cover (0.1 m or less)

Type	Cover	Type	Cover
snow	%	fern	%
water	%	shrub	%
rock	%	tree	%
bare dirt/mud	%	moss	%
litter	%	H 1:	%
downed wood	%	H 2:	%
grass	%	H 3:	%
sedge	%	H 4:	%
forb	%		

Plot 2 Habitat:_____ Avg. tree canopy ht.:_____m Avg. shrub canopy ht.:_____m

Avg. herb canopy ht.:_____cm Avg. tree sub-canopy ht.:_____m Avg. shrub sub-canopy ht.:_____m

Tree Species	0-23 cm	24-53 cm	54-81 cm	82-122 cm	>122 cm	Cov > 20 m	Cov 5-20 m
						%	%
						%	%
						%	%
						%	%
						%	%
						%	%
SHRUBS						%	%
Snags (>1.5m tall)							
Logs > 20cm DBH	Decay =1		Decay=2		Decay=3	**Total Cover**	%	%

Woody Vegetation between 0.1 m and 5.0 m

Total Cover:_____% Shrub Cover Only:_____%

Species	Cover	Avg. Ht. (m)
	%	
	%	
	%	
	%	
	%	
	%	
	%	
TREES	%	

Ground cover (0.1 m or less)

Type	Cover	Type	Cover
snow	%	fern	%
water	%	shrub	%
rock	%	tree	%
bare dirt/mud	%	moss	%
litter	%	H 1:	%
downed wood	%	H 2:	%
grass	%	H 3:	%
sedge	%	H 4:	%
forb	%		

Olympic National Park Point Count Densiometer Readings

Transect:_____ Date:_____ Observer:_____

Note: Please record the number of OPEN quarter-squares!!!

Point 1			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 2			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 3			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 4			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 5			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 6			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 7			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 8			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 9			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 10			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 11			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 12			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Point 13			
North: _____/96	East: _____/96	South: _____/96	West: _____/96

Olympic National Park Inventory Rare Bird Report Form

Obs.:	Species:	Date: / /2003	Qty:	Northing: __ __ __ __ __ __ __	Easting: __ __ __ __ __ __	Time:
Transect and point, if detected during a point count:						
Description (include diagnostic plumage and vocalization details used to identify the individual, sex, #'s, and any nest sightings or behavior indicative of nesting):						

Obs.:	Species:	Date: / /2003	Qty:	Northing: __ __ __ __ __ __ __	Easting: __ __ __ __ __ __	Time:
Transect and point, if detected during a point count:						
Description (include diagnostic plumage and vocalization details used to identify the individual, sex, #'s, and any nest sightings or behavior indicative of nesting):						

Obs.:	Species:	Date: / /2003	Qty:	Northing: __ __ __ __ __ __ __	Easting: __ __ __ __ __ __	Time:
Transect and point, if detected during a point count:						
Description (include diagnostic plumage and vocalization details used to identify the individual, sex, #'s, and any nest or behavior indicative of nesting):						

Hitlist:
All Loon spp.
All Grebe spp.
Pelican spp.
Cormorant spp.
All Seabirds
MAMU
All Waterfowl
Scoter spp.
Merganser spp.
TUVU
OSPR
WTKI
BAEA
NOHA
SSHA, COHA
NOGO, RTHA
GOEA
AMKE, MERL
PEFA
RNPH
SPGR, WTPT
MOUQ, CAQU
VIRA
Shorebird spp.
All Gull spp.
All Tern spp.
BTPI, MODU
All Owl spp.
CONI, BLSW
ANHU
BEKI
LEWO, RBSA
WIFL, DUFL
WEWP, WEKI
WESJ, CLNU
HOLA
All Swallows
REVI
CANW, BEWR
HOWR, MAWR
RCKI
WEBL, MOBL
TOSO, NOMO
AMPI, EUST
CEDW, GRCA
HEWA
AMRE, COYE
VESP, SAVS
FOSP, LISP
GCSP, LAZB
WEME, YHBL
BUOR, RWBL
BRBL, BHCO
GCRF, PIGR
PUFI, CAFI
WWCR, AMGO

Or anything you even suspect may be unusual or outside its normal range.

OLYMPIC NATIONAL PARK BIRD INVENTORY DAILY JOURNAL

Transect:_____ Quad:_____ Date:_____/____/_____ Bird Obs.:_____ Veg. Obs.:_____

Transect Turning Points

Point number:_____ New direction:_____

Explanation:_____

_____

Point number:_____ New direction:_____

Explanation:_____

_____

Point number:_____ New direction:_____

Explanation:_____

_____

Point number:_____ New direction:_____

Explanation:_____

_____

Transect notes (describe transect route including crossing creeks/rivers and vegetation types encountered):

_____

_____

_____

_____

_____

Weather:_____

_____

_____

_____

Vegetation phenology and natural history observations (include interesting avian encounters/observations; please record unusual bird sightings here and on the Rare Bird Report Form):

_____

_____

_____

_____

_____

Other:_____

_____

Appendix C. Scientific names of all bird species listed in this report

Common Name	Scientific Name[1]
Brown Pelican	*Pelecanus occidentalis*
Double-crested Cormorant	*Phalacrocorax auritus*
Pelagic Cormorant	*Phalacrocorax pelagicus*
Great Blue Heron	*Ardea herodias*
Turkey Vulture	*Cathartes aura*
Canada Goose	*Branta canadensis*
Wood Duck	*Aix sponsa*
Mallard	*Anas platyrhynchos*
Greater Scaup	*Aythya marila*
Harlequin Duck	*Histrionicus histrionicus*
White-winged Scoter	*Melanitta fusca*
Bufflehead	*Bucephala albeola*
Barrow's Goldeneye	*Bucephala islandica*
Hooded Merganser	*Lophodytes cucullatus*
Common Merganser	*Mergus merganser*
Red-breasted Merganser	*Mergus serrator*
Osprey	*Pandion haliaetus*
Bald Eagle	*Haliaeetus leucocephalus*
Sharp-shinned Hawk	*Accipiter striatus*
Northern Goshawk	*Accipiter gentilis*
Red-tailed Hawk	*Buteo jamaicensis*
American Kestrel	*Falco sparverius*
Ruffed Grouse	*Bonasa umbellus*
Blue Grouse	*Dendragapus obscurus*
California Quail	*Callipepla californica*
Virginia Rail	*Rallus limicola*
Killdeer	*Charadrius vociferus*
Black Oystercatcher	*Haematopus bachmani*
Greater Yellowlegs	*Tringa melanoleuca*
Spotted Sandpiper	*Actitis macularia*
Whimbrel	*Numenius phaeopus*
Marbled Godwit	*Limosa fedoa*
Western Sandpiper	*Calidris mauri*
Least Sandpiper	*Calidris minutilla*
Pectoral Sandpiper	*Calidris melanotos*
Bonaparte's Gull	*Larus philadelphia*
Ring-billed Gull	*Larus delawarensis*
Western Gull	*Larus occidentalis*
Glaucous-winged Gull	*Larus glaucescens*
Caspian Tern	*Sterna caspia*
Pigeon Guillemot	*Cepphus columba*

Appendix C. Scientific names of all bird species listed in this report (continued).

Common Name	Scientific Name[1]
Marbled Murrelet	*Brachyramphus marmoratus*
Band-tailed Pigeon	*Columba fasciata*
Mourning Dove	*Zenaida macroura*
Northern Pygmy-Owl	*Glaucidium gnoma*
Spotted Owl	*Strix occidentalis*
Barred Owl	*Strix varia*
Common Nighthawk	*Chordeiles minor*
Vaux's Swift	*Chaetura vauxi*
Rufous Hummingbird	*Selasphorus rufus*
Belted Kingfisher	*Ceryle alcyon*
Red-naped Sapsucker	*Sphyrapicus nuchalis*
Red-breasted Sapsucker	*Sphyrapicus ruber*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Northern Flicker	*Colaptes auratus*
Pileated Woodpecker	*Dryocopus pileatus*
Olive-sided Flycatcher	*Contopus cooperi*
Western Wood-Pewee	*Contopus sordidulus*
Willow Flycatcher	*Empidonax traillii*
Hammond's Flycatcher	*Empidonax hammondii*
Pacific-slope Flycatcher	*Empidonax difficilis*
Cassin's Vireo	*Vireo cassinii*
Hutton's Vireo	*Vireo huttoni*
Warbling Vireo	*Vireo gilvus*
Gray Jay	*Perisoreus canadensis*
Steller's Jay	*Cyanocitta stelleri*
Clark's Nutcracker	*Nucifraga columbiana*
American Crow	*Corvus brachyrhynchos*
Common Raven	*Corvus corax*
Horned Lark	*Eremophila alpestris*
Tree Swallow	*Tachycineta bicolor*
Violet-green Swallow	*Tachycineta thalassina*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Cliff Swallow	*Petrochelidon pyrrhonota*
Barn Swallow	*Hirundo rustica*
Black-capped Chickadee	*Poecile atricapillus*
Chestnut-backed Chickadee	*Poecile rufescens*
Red-breasted Nuthatch	*Sitta canadensis*
Brown Creeper	*Certhia americana*
Winter Wren	*Troglodytes troglodytes*
Marsh Wren	*Cistothorus palustris*
American Dipper	*Cinclus mexicanus*
Golden-crowned Kinglet	*Regulus satrapa*

Appendix C. Scientific names of all bird species listed in this report (continued).

Common Name	Scientific Name[1]
Ruby-crowned Kinglet	*Regulus calendula*
Townsend's Solitaire	*Myadestes townsendi*
Swainson's Thrush	*Catharus ustulatus*
Hermit Thrush	*Catharus guttatus*
American Robin	*Turdus migratorius*
Varied Thrush	*Ixoreus naevius*
European Starling	*Sturnus vulgaris*
American Pipit	*Anthus rubescens*
Cedar Waxwing	*Bombycilla cedrorum*
Orange-crowned Warbler	*Vermivora celata*
Yellow Warbler	*Dendroica petechia*
Yellow-rumped Warbler	*Dendroica coronata*
Black-throated Gray Warbler	*Dendroica nigrescens*
Townsend's Warbler	*Dendroica townsendi*
MacGillivray's Warbler	*Oporornis tolmiei*
Common Yellowthroat	*Geothlypis trichas*
Wilson's Warbler	*Wilsonia pusilla*
Western Tanager	*Piranga ludoviciana*
Spotted Towhee	*Pipilo maculatus*
Chipping Sparrow	*Spizella passerina*
Savannah Sparrow	*Passerculus sandwichensis*
Fox Sparrow	*Passerella iliaca*
Song Sparrow	*Melospiza melodia*
White-crowned Sparrow	*Zonotrichia leucophrys*
Golden-crowned Sparrow	*Zonotrichia atricapilla*
Dark-eyed Junco	*Junco hyemalis*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Red-winged Blackbird	*Agelaius phoeniceus*
Brown-headed Cowbird	*Molothrus ater*
Gray-crowned Rosy-Finch	*Leucosticte tephrocotis*
Pine Grosbeak	*Pinicola enucleator*
Purple Finch	*Carpodacus purpureus*
Red Crossbill	*Loxia curvirostra*
Pine Siskin	*Carduelis pinus*
American Goldfinch	*Carduelis tristis*
Evening Grosbeak	*Coccothraustes vespertinus*

[1]Names follow American Ornithologists' Union Check-list of North American Birds.

Appendix D: Scientific names of all plant species listed in this report

Common Name	Scientific Name[1]
Western Hemlock	*Tsuga heterophylla*
Mountain Hemlock	*Tsuga mertensiana*
Douglas-fir	*Pseudotsuga menziesii*
Pacific Silver Fir	*Abies amabilis*
Subalpine Fir	*Abies lasiocarpa*
Sitka Spruce	*Picea sitchensis*
Lodgepole Pine	*Pinus contorta*
Western Redcedar	*Thuja plicata*
Alaska Yellowcedar	*Chamaecyparis nootkatensis*
Red Alder	*Alnus rubra*
Bigleaf Maple	*Acer macrophyllum*

[1]Names follow Pojar and Mackinnon (1994).

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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National Park Service
U.S. Department of the Interior

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